BLM LIBRARY
88078631

National Science and Technology Center

Fiscal Year 2001 Annual Report

U.S. Department of the Interior
Bureau of Land Management

JK
870
.L3
N3747
2001
c.2

applying current and

accurate science and technology to

support land and resource

management decisions

—National Science and Technology Center

This report is available on the Internet at ***http://www.blm.gov/nstc***.

#71810938 ID:88078631
JK 870 .L3 N3747 2001 c.2

National Science and Technology Center

Fiscal Year 2001 Annual Report

BLM Library
Denver Federal Center
Bldg. 50, OC-521
P.O. Box 25047
Denver, CO 80225

By

National Science and Technology Center Leadership Team

U.S. Department of the Interior
Bureau of Land Management
May 2002

National Science and Technology Center

Lee Barkow, Director
Mike Kirby, Associate Director

Division of Architecture and Engineering Services

Robert Hart, Chief
Tom Busch, Branch Chief, Building Engineering Services
Pat Fleming, Branch Chief, Site Engineering Services

Division of Geographic Sciences

Fred Batson, Chief
William L. Jackson, Branch Chief, Cartographic Applications
Neffra Matthews, Branch Chief, Photogrammetric Applications

Division of Science

Charisse Sydoriak, Chief
Debra Dinville, Branch Chief, Resource Systems and Remote Sensing/GIS Applications
Dan Muller, Branch Chief, Science Applications
Tom Roberts, Branch Chief, Science Investigations
Dave Schafersman, Branch Chief, Environmental Compliance

Information and Communications Staff

Terry D'Erchia, Chief
Barbara Campbell, Bureau of Land Management Library Director

Suggested citation:

National Science and Technology Center Leadership Team. 2002. National Science and Technology Center: Fiscal Year 2001 Annual Report. Bureau of Land Management, Denver, Colorado. vi + 62 pp.

Contents

The Director's Message vi

Supporting Land and Resource Management Decisions 1

Architecture and Engineering: Designing a Better Infrastructure 1

Amboy Crater National Natural Landmark 1
Bridge Inspections and Replacements 2
Southern Arizona Road Improvements 3
Red Rock Canyon National Conservation Area Signage 3
Mackay Reservoir Recreation Site: Site Rehabilitation Study 3
Lower Colorado River Long-term Visitor Areas 4
California National Historic Trails Interpretive Center 4
Meadowood Farm 4
Value Analysis Studies: Arctic Interagency Visitor Center and Big Water Visitor Center 5
National Engineering Program Support 5
National Interagency Fire Center 6

Cartography: Maps for Managers and the Public 8

Automation of the Bureau's 100K Map Series 8
El Malpais Recreation Guide Map Project 8
National Bureau Public Lands Database 9
Development of Standard Recreational Symbology 9
Center Web Map of Bureau Administrative Jurisdictions 10

Photogrammetry: A Closer Look at Resource Issues 10

Lake Havasu Recreation Sites 10
Vekol Valley Road Improvements 11
Photogrammetric Mapping of the Collet Wash Tracksite at Grand Staircase–Escalante National Monument 11
Technical Guidance and Support of the National Off-highway Vehicle Strategy 12
Integrating Geographic Information Systems Technology With the Visual Resource Management Inventory Process 12
Data Analysis Support for the National Petroleum Reserve—Alaska 13
Geo-Positioning Selection Guide Update 13
Locating Coalbed Methane Seeps by Using Remote Sensing 13

Science Investigations: What's New in Science 14

Bureau Science Strategy and Implementation 14
National Landscape Conservation System Science Plans 14
Employment and Income Attributable to Bureau-oriented Recreation in the Western United States 15
Reference Areas for Sagebrush–Steppe Restoration 15

Science Applications: Using Science to Manage the Land 16

Salt Creek Evaluation 16
Table Mountain Fire Assessment 17
Pinedale Anticline Groundwater Monitoring Plan 18

Forest Vegetation System Installations 18
Ecological Site Technical Reference Development 19
Virgin River Habitat Model Comparisons 19
Water Erosion Prediction Workshop 19

Environmental Compliance: Toward a Better Natural Environment 20

Manning Canyon Tailings Engineering Evaluation and Cost Analysis and Cleanup Design 20
Sunrise Landfill Characterization 20
Caselton Mine and Mill Tailings "Potentially Responsible Party" Search 21
Iron Mountain Natural Resource Damage Assessment and Restoration 21
Henson Creek Watershed Water Quality Loading Analysis 22

Resource Systems and Remote Sensing/GIS Applications: Getting the Big Picture 23

Wetland Delineation for the South Platte Headwaters in Colorado 23
Colorado Vegetation Classification Project 23
Rangeland GIS With Extensions 24
HB (Wild Horse and Burro) User Representative 25
Susanville Interagency Fire Center Digital Dispatch Map 25
Priority Subbasins Identification Project 26
Rangeland Administration System 26
National Technical Means Data for Vegetation and Fuel Model Trend Analysis 26
FY 2003 Budget Focus Areas 27

The Bureau Library: Sharing Knowledge 27

Literature Searches 27
Providing Supporting Documentation 28
Cadastral Survey Information 28
BLM Library Update 28
Reference Services 28
Web Access to Databases 28
Table of Contents Service 29

Publications Support: Delivering the Message 29

Public Rewards From Public Lands 29
Safety and Health Management Handbook 30
Vantage 30
Corporate Metadata Repository 31
Wild Horse and Burro Handbook 31
Western Springs Guide 31
Bureau Annual Performance Plan 32
Interpreting Indicators of Rangeland Health 32
Invasive Plants Brochures 32
National Science and Technology Center Web Site 33

Creating Opportunities While Meeting Management Challenges 34

Project Partnerships 34

Bureau of Land Management Great Basin Restoration Initiative 34
San Miguel River Basin Study 35
GeoMAC: Bringing Wildland Fire Technology to the Twenty-first Century 36
Cooperative Remote Sensing/GIS Project Between Florida A&M University and the National Science and Technology Center 36

Contractors 37

Architecture and Engineering Service Contracts 37
Remote Sensing and GIS Contracts 37

Environmental Technical Assistance Contract 37
Construction Management 38
Increase in Production of Bureau Automated 100K Maps 38

National Science and Technology Center Staff Detailed Externally 38

Lee Barkow—Detail to the Colorado State Office 38
Debra Dinville—Detail to the DOI National Business Center and the Bureau's Colorado State Office 39
Dianne Osborne—Detail to the U.S. Geological Survey 39
Bruce Van Haveren—Detail to the U.S. Geological Survey 39

Personnel Detailed at the National Science and Technology Center 39

Marvin Keller—Acting Chief, Science Investigations Branch 39
Jaci Gould—Acting Chief, Science Investigations Branch 40
Jennifer Gaines—Acting Chief, Resource Systems and Remote Sensing/GIS Applications Branch 40
Lori Postlethwait—Acting Chief, Resource Systems and Remote Sensing/GIS Applications Branch 40

Other Personnel Working at the National Science and Technology Center 40

Liaison 40
Interns 40
Volunteers 41

Reaching Out to Others 42

Professional Commitment to Outreach 42

The Bureau's 1999 Volunteer Annual Report 42
National Public Lands Day Activities 42
Denver Federal Executive Board 2001 Diversity Training Seminar 43

Present and Future Constituents 43

Sweetwater County Fair Display 43
MESA Conference 43
National Boy Scout Jamboree Exhibit 43
Denver Area Council of the Boy Scouts of America 44
Lou's Soap Box 44
Take Our Children to Work Day 44

Adjunct Faculty Affiliations 45

Sisseton–Wahpeton Community College 45
Florida A&M University 45

Professional Activities and Recognition 46

Publications 46
Presentations 47
Staff Contributions to the National Training Cadre 49
Awards 49

Looking Toward the Future 50

Acronyms 51

Appendix A. Projects Completed in Fiscal Year 2001 52

Appendix B. National Science and Technology Center Organization 60

The Director's Message

I am pleased to present to you the Fiscal Year 2001 Annual Report for the National Science and Technology Center (Center). A year has passed since we refocused our mission and changed our name. The changes that we have made are intended to ensure that we are doing the most valuable work in support of the field and meeting the highest and broadest needs of the Bureau. Our new look returns to a more traditional organization with three divisions and one staff. This organization is in response to internal and external comments that a more traditional organization is easier for customers to understand when seeking particular services and assistance. Our refined mission seeks to focus on what we believe is our core mission: providing scarce or senior technical expertise to field offices, investigating and prototyping technology applications, and assisting the field in acquiring the needed science to address management issues.

Fiscal Year 2001 has provided many opportunities and challenges. Throughout this report, we highlight some of the 400-plus projects we have worked on that we believe represent the types of assistance we provide.

During the year, we were host to many individuals who joined our staff as part of such programs as the Departmental Team Leadership Program and college interns. In addition, several of our staff have taken assignments with other organizations. The opportunity to have people work with us and for our staff to work with others provides an environment that is stimulating to the entire Center. Finally, the staff at the Center have been involved in numerous professional activities and have received recognition from others. Participation in activities outside the Center allows our professionals to be recognized for the expertise that they bring—individually and collectively—to the Bureau.

The past year has been a good one. We have met the challenges that have been placed before us, both organizationally and technically. We have gone a long way in solidifying our role in the Bureau through a solid track record of providing quality products and services, on time and within budget. We have been successful in promoting the use of science in public land management through our technical assistance to the field and by building partnerships with our various science providers. We look forward to continuing to build on our previous successes next year and into the future.

Thank you for your support. We welcome your comments on and opinions of our annual report so that we can make subsequent reports as usable to you, our customers, as possible. The entire staff of the National Science and Technology Center looks forward to our future associations.

Lee Barkow, Director

Lee Barkow

Supporting Land and Resource Management Decisions

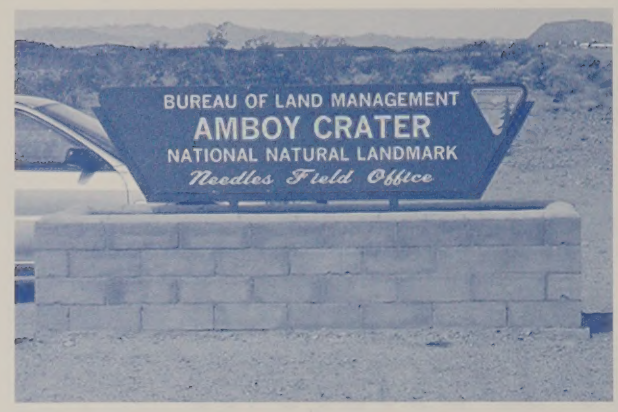
The National Science and Technology Center (Center) of the Bureau of Land Management (BLM or Bureau) provides a broad spectrum of services in areas such as physical, biological, and social science assessments; architecture and engineering support; library assistance; mapping science; photo imaging; geographic information systems applications; and publications support. The staff provides synthesized scientific information for application to specific management or resource issues, assesses the synthesized information and provides insights into available data formats and technologies, identifies current technologies or developing applications, and identifies and develops partnerships with organizations and institutions that can provide scientific services and expertise.

Architecture and Engineering: Designing a Better Infrastructure

The staff of the National Science and Technology Center provides a full range of architectural and engineering services—from technical analysis, review, and consultation on small projects to planning, design, and construction administration services on major Bureau structures. The Center staff is presently working in concert with other Bureau architectural and engineering staffs to help plan and construct new Bureau facilities and to maintain, repair, and rehabilitate other structures. In addition to the planning, design, and construction administration programs, the Center frequently provides technical assistance and guidance on national architectural and engineering initiatives, such as value engineering, seismic safety and compliance, radio tower replacements, metric conversion, accessibility, sustainability, and energy conservation. Highlights of work accomplished in Fiscal Year (FY) 2001 follow:

Amboy Crater National Natural Landmark (California)

Amboy Crater, a volcanic cinder cone 250 feet high and 1,500 feet in diameter, is part of one of the youngest volcanic fields in the United States. The field was created by six distinct periods of eruptions that took place between 6,000 and 500 years ago. Its recent origin, nearly perfect shape, and lack of mining activity led to its designation as a National Natural Landmark in 1973. A National Natural Landmark is an area of national significance because it represents one of the best-known examples of a natural region's characteristic biotic or geologic features.



Amboy Crater is located in the desert of south-central California, less than 1 mile south of historic Route 66 near the town of Amboy. Access to the site is on a rough, unpaved road. The site has only two unshaded picnic tables for amenities. At the request of the Needles Field Office, Center staff prepared designs and construction contract documents not only for improving the access road to a paved, two-lane standard, but also for formalizing plans, paving parking areas, and constructing a new entrance sign, wayside exhibits, restrooms, and shade and picnic shelters, with concrete pathways to interconnect all these elements. Two stabilized, low-water crossings were also designed to withstand flooding and drainage of the large desert alluvium that the road crosses. Construction of the amenities is planned for late 2001.

Client and office: Lesly Smith, Needles Field Office, California

NSTC project participants: Dave Droullard, Pat Fleming, Tanya Mikita

Bridge Inspections and Replacements (California, Idaho, Montana, Nevada, Wyoming)

Center staff prepared construction contract documents to replace Whitaker Bridge in Montana, Sand Creek Bridge in Wyoming, and Trout Creek Bridge in Nevada. Actual construction of the bridges is planned for 2001–2002. Whitaker Bridge is an old railroad bridge on a railroad right-of-way that was acquired by the Bureau. The purpose of this project was to construct a new deck on the existing superstructure to provide access for vehicular traffic. The original Sand Creek Bridge was a wooden bridge declared unsafe years ago because of failed and missing structural members. Subsequently, the structurally deficient bridge was closed and ultimately burned by Bureau personal, and a low-water crossing was used for access. However, because traffic has increased in the area and the low-water crossing is inaccessible during periods of high streamflow, the need for a new bridge was identified. Trout Creek Bridge is another timber bridge that is deficient for the intended use; its allowable load-carrying capacity is less than what is required.

The Center provided inspection services to the California, Idaho, and Wyoming State Offices in its continued support of this program. Bridges and major culverts identified for retention through the Bureau Planning System (which establishes the need for a structure) must be maintained in a safe condition. To identify any deficiencies in a structure, the bridge or major culvert must be inspected in 2-year cycles by qualified personnel in accordance with the National Bridge Inspection Standards, Part 650, Chapter 23, Code of Federal Regulations. Bureau State Engineers request Center assistance in performing these inspections when they do not have the resources or the capability to do so.

A report of the inspection for each bridge was sent to each State Office, analyzing the condition of the different elements of the structure. If any deficiencies were revealed, the Center recommended repairs and associated costs. In addition, normal maintenance work was identified to keep the structure in a safe condition. When a bridge or major culvert is identified for retention through the Bureau Planning System and is determined to be unsafe or deficient for the specified use, its replacement is required.

Client and office: Merlin McDaniel, California State Office
NSTC project participant: Keith Christiansen

Client and office: Gary Stevens, Idaho State Office
NSTC project participant: Keith Christiansen

Client and office: Greg Bergum, Montana State Office
NSTC project participant: Keith Christiansen

Client and office: Norm Rockwell, Elko Field Office, Nevada
NSTC project participant: Keith Christiansen

Client and office: Jim Kor, Wyoming State Office
NSTC project participant: Keith Christiansen

Client and office: Jim Kor, Wyoming State Office
NSTC project participants: Keith Christiansen, Elizabeth Smith

Southern Arizona Road Improvements (Arizona)

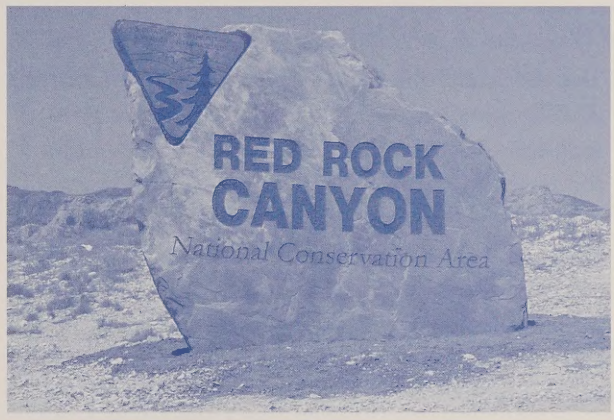
The Arizona State Office requested that the Center improve roads used by the public, ranchers, and the Bureau to access Hot Dunes Recreation Site, Cienega Ranch, and other Bureau-administered lands in the southern part of the State. These roads had gradually deteriorated over the years or had been damaged by storm runoff, while their use had increased dramatically. The Center prepared construction contract documents for improvements to more than 37 miles of the Bureau's Empire–Cienega Road and Haekel Road in southern Arizona. Center recommendations include road regrading and resurfacing, drainage improvements, culvert replacements, new low-water crossings, and intersection improvements.

Client and office: Bruce Beierle, Arizona State Office
NSTC project participants: Dave Droullard, Mary Anne Zehrt-Belding

Red Rock Canyon National Conservation Area Signage (Nevada)

Red Rock Canyon National Conservation Area (NCA) is one of nine NCAs managed by the Bureau. Located 10 miles west of Las Vegas, this 197,000-acre area provides a 13-mile scenic drive, more than 30 miles of hiking trails, picnic areas, and a visitor center with exhibit rooms and a bookstore. Red Rock Canyon NCA receives more than 1 million visits annually from the local community and from American and foreign tourists.

The growing number of visits to the area led to a rapid expansion of facilities and a tremendous increase in traffic. One result of this rapid growth was that the existing signs, without a plan, had become obtrusive, ineffective, and inaccurate. The Center, as requested by Area Manager Greg Gnesios, produced a comprehensive plan for consolidating, improving, and replacing the entrance and providing directional information and traffic signage throughout the area. One of the most well-received design changes to date has been the installation of the cut stone entrance signs that mimic the red rock formations for which the area is named.



Client and office: Greg Gnesios, Red Rock Canyon National Conservation Area, Nevada
NSTC project participants: Dave Droullard, Pat Fleming, Toni Griffin, Sue Weber

Mackay Reservoir Recreation Site: Site Rehabilitation Study (Idaho)

The Challis Field Office plans to rehabilitate the Joe T. Fallini Campground facilities at the Mackay Reservoir Recreation Site. Mackay Reservoir is located 6 miles northwest of Mackay and 56 miles southeast of Challis, on Highway 93. The campground was constructed in the late 1960s to accommodate camping and day-use activities adjacent to Mackay Reservoir. Heavy use, changing demands and regulations, and deterioration of the more than 30-year-old site is causing a health and safety hazard for visitors. Center staff provided Gary Stevens, Idaho State Office, with a conceptual site plan for facilities, including updating the potable water system; redesigning roadways; establishing boat and trailer parking; providing tent, trailer, and recreational

vehicle campsites, including two group sites and a "host" site; upgrading picnic sites with a group shelter and restrooms; and constructing a sewage dump station, fish cleaning station, warming hut, play area, and short interpretive trail.

Client and office: Gary Stevens, Idaho State Office
NSTC project participants: Pat Fleming, Toni Griffin, Tanya Mikita, Kathy Williams

Lower Colorado River Long-term Visitor Areas (Arizona, California)

Two areas near the Lower Colorado River in Arizona and California have been designated by Congress as long-term visitor areas (LTVAs), where the public can establish campsites with tents or recreational vehicles for a minimal monthly fee. The Bureau established the unique LTVA program in 1983 to meet the recreation needs of winter visitors and to protect the remaining fragile desert environment. As these areas have become increasingly popular, they have sometimes overtaxed the modest Bureau water and wastewater infrastructure (fill stations for domestic water and dump stations for wastewater holding tanks). The development of potable water sources and environmentally sound wastewater disposal methods in the arid desert adjacent to the river has presented unique technical challenges.

Working in collaboration with the Yuma Field Office, Center staff prepared construction contract documents for improvements at the South Mesa LTVA, located about 20 miles north of Yuma on the California side of the Colorado River, and provided consultation during construction. Preliminary designs for improvements at the La Posa LTVA, south of Quartzite, Arizona, were also provided, and construction document preparation has begun for this site. As a result, both LTVAs will be better able to meet the recreation needs of public visitors without adverse effects to groundwater or surface waters.

Client and office: Scott DeBock, Yuma Field Office, Arizona
NSTC project participants: Pat Fleming, Dennis Grevel, Romeo Singson

California National Historic Trails Interpretive Center (Nevada)

Nearly 300,000 emigrants traveled West through Nevada on the California Trail between 1840 and 1870. The 1,800-mile, 6-month journey from St. Joseph, Missouri, to the Central Valley of California saw twice as many emigrants as all the other trails combined. Remnants of the wagon passage could still be identified on aerial photographs taken during construction of Interstate 80 in the 1960s. To commemorate this historic Westward migration, the Bureau is working in partnership with local communities to establish an interpretive center near Elko, Nevada.

The Center was asked by the Nevada State Office to conduct feasibility and site analysis studies for the proposed interpretive center. Studies were completed through the Bureau's national architecture and engineering contract and a preferred site location was selected. Many criteria, such as site character, views, and interpretation opportunities; land uses, land zoning, and context constructability; environmental and natural hazards; and visitation, site access, and architectural constraints were investigated to assist Bureau managers and cooperators in making informed decisions. Of primary concern to all parties was the economic feasibility of the proposed undertaking. The final report provided by the Center anticipated visitation and operational issues, providing valuable insights that allowed the Bureau to determine how best to proceed with this high-visibility project. Further development of the project is planned in FY 2002.

Client and office: Jon Ekstrand, Nevada State Office
NSTC project participant: Tom Busch

Meadowood Farm (Eastern States)

Meadowood Farm is an 800-acre, undeveloped parcel of land in northern Virginia, not far from Washington, D.C. Although the farm has been used as a horse boarding stable with riding facilities, it was acquired by the Bureau through a recent land exchange. Staff at the Eastern States Office, who will manage the resource, envision the development of an education center to inform the public about the various resources and activities of the Bureau's Wild

Horse and Burro Program. The Center was asked by staff of the Eastern States Office, Springfield, Virginia, to evaluate and conduct a site analysis of Meadowood Farm. The site analysis report, prepared in 1 month by two architects, a civil engineer, and a landscape architect from the Center, became an integral element in the acquisition of the property.

Client and office: Charles Bush, Eastern States Office
NSTC project participants: Tom Busch, Frank Ciesel, Pat Fleming, Russ Virgin

Value Analysis Studies—Arctic Interagency Visitor Center and Big Water Visitor Center (Alaska, Utah)

Bureau policy requires that a value analysis or value engineering study be considered for any construction project costing more than $500,000. Value analysis is not a critical review, construction feasibility assessment, or cost-cutting exercise. It is a problem-solving and decision-making technique that bypasses learned responses to produce alternative solutions that achieve all required functions of the original design at the least cost over the life of the facility. This team approach follows an established, organized job plan and a problem identification format that promotes objectivity and stimulates creativity. When the value analysis methodology is followed precisely, beneficial results are ensured.

If conducted early in the project process, during programming and schematic design, a value analysis can assist Bureau management in determining if a proposed alternative meets the intended purpose. It can identify options for lower cost or more efficient alternatives. And it can also recommend overall "best value."

Although the Center routinely conducts value analyses on the products it generates, it also provides this service on an as-available basis for field-generated designs, as was provided for the Arctic Interagency Visitor Center, Coldfoot, Alaska, and Big Water Visitor Center, Grand Staircase–Escalante National Monument (GSENM), Utah.

Client and office: Curt Fortenberry, Alaska State Office
NSTC project participants: Tom Busch, Pat Fleming, Bob Hart (with assistance from Trent Duncan, Utah State Office, and Merlin McDaniel, California State Office)

Client and office: Casey Matthews, Utah State Office
NSTC project participants: Tom Busch, Lydia Creager (with assistance from Kate Hammond and Wray Kleihege, National Park Service, and Bryce Lloyd, GSENM)

National Engineering Program Support (Washington Office)

During FY 2001, the Center continued to provide technical assistance and guidance on national architectural and engineering program initiatives, including condition assessments of Bureau roads, accessibility assessments of recreation sites, and value engineering studies. The Center continues to evaluate seismic safety and compliance, participate in workgroups to evaluate radio tower safety, and incorporate sustainable materials and energy conservation into its designs.

During its second year of administering the contract, the Center was allocated about $2 million to complete evaluations of the Bureau's level 4 and 5 roads (highest quality of road maintained by the Bureau). Most of the level 4 and 5 road assessments were completed through the contract, enabling the Bureau to proceed ahead of schedule in its assessment of level 3 roads. The condition assessments

have also been instrumental in identifying deferred maintenance needs and their related costs, so they can be included in the Bureau's Five-year Deferred Maintenance and Capital Improvement Plans.

Client and office: Bernie Hyde, Washington Office
NSTC project participant: Frank Ciesel

The Center was allocated about $1 million to conduct full accessibility assessments and to make recommendations on Bureau recreation facilities. These assessments helped Bureau management identify which improvements could be made at its recreation sites to make them fully accessible to people with disabilities. The recommendations contained within the assessment reports, performed by experts from the Bureau of Reclamation, are recorded in the Accessible Data Management System, which is maintained by the Bureau of Reclamation. An end-of-year report identifying the specific work done and project requirements by State, location, site name, and identified cost for maintenance is also provided. The report outlining projected costs will help managers identify budgets necessary to make these facilities accessible.

Client and office: Bernie Hyde, Washington Office
NSTC project participant: Frank Ciesel

Although the Center provided technical program support for many other engineering activities, it was particularly active in the Seismic Safety Program and the replacement of communication towers for various programs Bureauwide. The Center continues to oversee the national effort to ensure that all Bureau administrative sites are in compliance with national standards for seismic safety. Through an agreement with the Bureau of Reclamation, Rapid Visual Surveys were completed. The survey data were captured in a Bureauwide database to help identify the Bureau's highest risk structures—those most susceptible to seismic failure. Of those structures that presented the greatest risk, Center staff continued to evaluate the structural stability of its buildings by performing the required Federal Emergency Management Agency structural analysis studies. These analyses help further define structural safety concerns with high-risk structures.

Client and office: Linda Force, Washington Office
NSTC project participant: Elizabeth Smith

Center staff have participated in a national effort to identify structurally deficient communication towers. Structurally deficient towers are those that no longer meet industry standards and do not ensure the safety of employees during service or maintenance. After spending months resolving the safety requirements (identifying the appropriate authorities and standards) associated with this issue, the workgroup devised a strategy to replace high-priority radio towers over a 3-year period and to establish a 3-year Comprehensive Radio Tower Condition Assessment program.

Client and office: Elliot Ng, Washington Office
NSTC project participant: Elizabeth Smith

National Interagency Fire Center (Arizona, Idaho, Nevada, Utah)

The National Interagency Fire Center (NIFC) in Boise, Idaho, is the Nation's support center for wildland firefighting. Seven Federal agencies, including the Bureau, work together to coordinate and support wildland fire and disaster operations.

The increase in wildfires over the past few years has resulted in additional construction funding for the fire program. As a result, in FY 2001 alone the Center has prepared contract documents for two air tanker bases (ATBs) and more than six fire stations.

Most of the designs for the fire stations (crew quarters) were derived from a standard that was approved and adopted nationally by NIFC about 2 years ago. The use of a standard design reduces the time it takes to prepare a construction bid package and provides consistency in fire facilities throughout the Bureau. The use of a previously tested design also decreases the need for costly contract modifications. The Center used the NIFC standard as a basis for the Nixon Fire Station (Arizona), Malad and

Rogerson Fire Stations (Idaho), Carlin Fire Station (Nevada), and Vernon Fire Station (Utah). Although the standard design was the basis for all of these stations, design features unique to each station were incorporated into all final projects, such as siting materials, foundation design, heating, ventilation, and air conditioning systems and, in some instances, alternative energy systems.

Client and office: Kim Schuett, Nevada State Office
NSTC project participants: Lydia Creager, Ernie Parrott, Dennis Grevel, Romeo Singson, Chanh Tran

Client and office: Dan Stone, Arizona State Office
NSTC project participants: Elizabeth Smith, Chanh Tran

Client and office: Gary Stevens, Idaho State Office
NSTC project participants: Lydia Creager, Pat Fleming, Dennis Grevel, Toni Griffin, Ernie Parrott

Client and office: Gary Stevens, Idaho State Office
NSTC project participants: Pat Fleming, Dennis Grevel, Toni Griffin, Ernie Parrott, Elizabeth Smith, Chanh Tran

Client and office: Gary Stevens, Idaho State Office
NSTC project participants: Ernie Parrott, Elizabeth Smith

Client and office: Gary Wieser, Utah State Office
NSTC project participants: Tom Busch, Toni Griffin, Tanya Mikita, Ernie Parrott, Mark Prichett, Chang Tran, Young Yu

The Center continues to work with NIFC in developing new design standards for other fire-related structures. A design workshop was held in Denver in February 2001 to begin the development of these standards. Representatives from NIFC, Bureau State Engineering Offices, the Forest Service, and the Center gathered to devise an action plan for developing the new standards. An existing ATB design prepared by the Forest Service was evaluated and adopted as the Bureau standard. Since the meeting, two ATB designs have been completed and are scheduled to be constructed before the June 2002 fire season. The design will be used at Cedar City, Utah, and Pocatello, Idaho. Conceptual designs for the engine storage garages and operations centers are presently being developed through a national architecture and engineering (A/E) contract.

Client and office: Dave Bott, Utah State Office
NSTC project participants: Frank Ciesel, Pat Fleming, Bob Hart, Elizabeth Smith, Chanh Tran, Young Yu

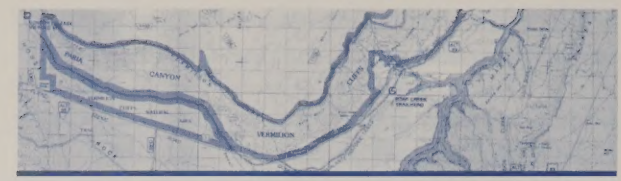
Client and office: Gary Stevens, Idaho State Office
NSTC project participants: Frank Ciesel, Pat Fleming, Elizabeth Smith, Chanh Tran, Young Yu

Conceptual design alternatives were developed for renovating the ATB at Battle Mountain (Nevada) Airport. The following items were considered as part of the site development and redesign of the airport: the expansion of existing structures; new and larger buildings, including an administration and operations center, pilot lounge, and storage area; circulation pattern improvements for pedestrians, cars, trucks, and aircraft; parking and loading areas for aircraft; retardant handling and mixing areas; retardant distribution and collection systems; and a storm water collection system, including a detention pond. Preliminary and final design packages for this multiphased construction project are under development.

Client and office: Jon Ekstrand, Nevada State Office
NSTC project participant: Bob Hart

Center architects and engineers are working closely with NIFC on other infrastructure improvements. For example, contract documents have been completed for the demolition and removal of old storage tanks, pumps, piping, valves, electrical components, and an operations center for an air tanker retardant loading facility. The Center was also part of an interagency design effort led by the Bureau of Reclamation to upgrade the aircraft operations ramp. Center personnel provided specifications for the installation of new pumps in a wastewater pump station and undertook a comprehensive study to update the storm water management plan for the NIFC campus.

Client and office: Paul Hefner, National Office of Fire and Aviation
NSTC project participants: Frank Ciesel, Bob Hart



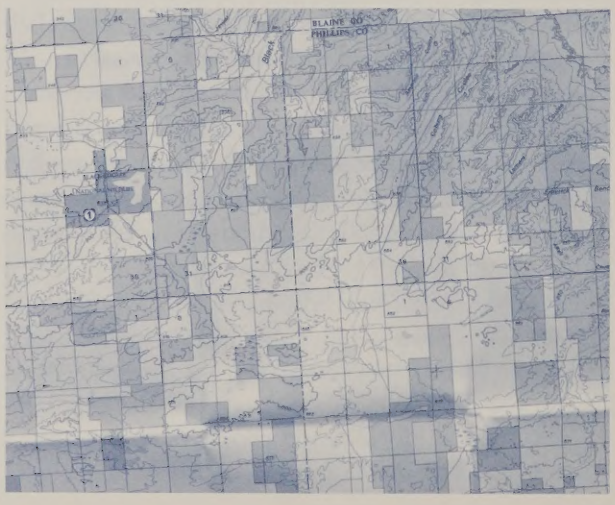
Cartography: Maps for Managers and the Public

Staff of the National Science and Technology Center are responsible for the design and production of a wide variety of mapping products, databases, and services that are used by all Bureau offices to administer Bureau-managed resources and by the general public for commercial and recreational pursuits. Highlights of work accomplished in FY 2001 follow:

Automation of the Bureau's 100K Map Series (Bureauwide)

Since the Bureau began publishing the 1:100,000-scale (100K) Surface Management Status map series in the 1970s, the maps have become the most popular intermediate-scale maps ever published by a Federal agency. This series remains the only map series that shows surface ownership for the entire Western United States.

In 1999, at the request of State Directors and Field Office Managers throughout the Bureau, the Center began automating the 100K map series by using ARC/INFO and ArcMacro software. The automated maps were designed to look like the traditional 100K series. A total of 48 Bureau 100K maps have now been digitally revised and printed, with an additional 39 maps presently in the production process.



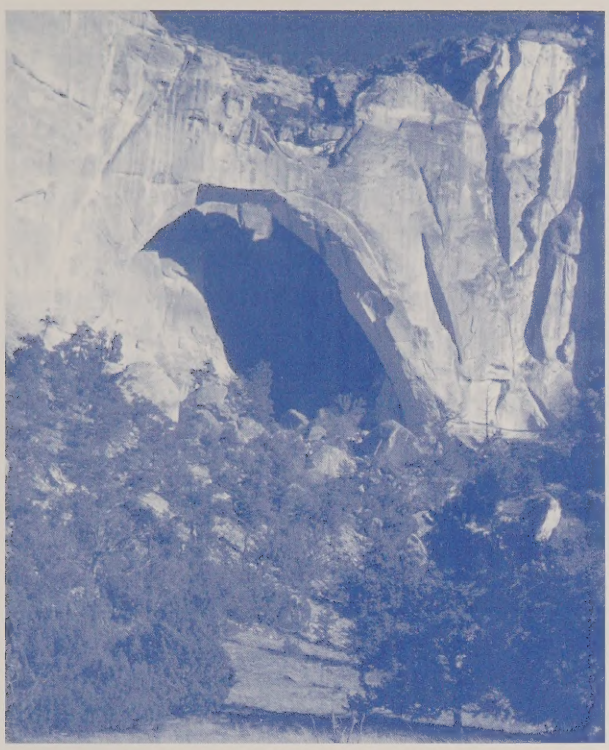
Automation of the Bureau's 100K map series has greatly reduced the time and cost of map compilation and produces a better looking, more consistent, and more accurate map. Maps are now produced at a fraction of what they once cost and are completed in days rather than in the weeks or months required when using the traditional manual compilation process. As an added benefit, the databases created by the automation process also lend themselves to other applications. For example, some or all of the data themes could be used to support land use planning, special mapping applications (such as delineating recreational opportunities and off-highway vehicle access), and geographic information systems applications. The digital data can also be served on Bureau Web pages for other uses.

Client and office: Mapping science lead in each State Office
NSTC project participants: Neal Anderson, Don Decicco, Susan Derr, Mary Ann Guinea, William L. Jackson, Chris Smith

El Malpais Recreation Guide Map Project (New Mexico)

El Malpais ("the badlands") is the historical Spanish name given to the lava flows near Grants, New Mexico. Combined, the El Malpais National Conservation Area and National Monument encompass 378,000 acres, including the lava flows, which are bounded by high sandstone bluffs on the east and a cluster of cinder cones called Chain of Craters on the west. The Ramah Navajo Indian Reservation is to the west, the Acoma Indian Reservation to the east, and the Cibola National Forest to the north.

The El Malpais Recreation Guide Map was updated with the assistance of Center cartographers, primarily for use by visitors to the public lands and regional land managers. This recreation map represents portions of four Bureau 1:100,000-scale Surface Management Status maps that have been appended to make one map. It shows highways, roads, topography, historic and nationally important trails, and land ownership. Recreation information includes



campground locations and four-wheel-drive and hiking trails. In addition to the map, accompanying photographs and narratives show the beauty of the rugged badlands and inform the public of the cultural history of the area with brief descriptions of popular destinations and significant special designations, such as the National Monument and Wilderness Areas. Safety reminders are included along with telephone numbers and agency office locations.

Client and office: Greg Homan, New Mexico Sate Office
NSTC project participants: Neal Anderson, Faye Bogan, Susan Derr, William L. Jackson, Janine Koselak, Hugh Wolfe
Partners: National Park Service, U.S. Forest Service, and the Ramah Navajo and Acoma Indian Reservation Tribal authorities

National Bureau Public Lands Database (Washington Office)

The U.S. Geological Survey (USGS) National Mapping Division created a digital National Atlas of all Federal and State ownership for the United States in 1997 and 1998. The Center, Bureau State Offices, and other Federal and State agencies provided input into the national ownership database of the atlas. The Planning, Assessment, and Community Support Group of the Bureau's Washington Office requested the Center's assistance in creating a better interim national database. State Offices provided statewide ownership and other accompanying metadata. In some instances, data were obtained from State agencies. After reviewing the data, a Center cartographer extracted Bureau lands data into individual State databases to compare them with the USGS National Atlas version of the Bureau dataset for possible conflicts. Individual State databases were then merged into a seamless national database of surface lands administered by the Bureau.

This information is being used to create a new national Bureau of Land Management public lands database to replace the older Bureau published and online maps. The database will serve in an interim capacity where national coverage is required until an improved ownership file can be prepared from other sources.

Client and office: Ed Harne, Washington Office
NSTC project participant: Keith Francis
Partner: Mike Badar, ESRI Corporation

Development of Standard Recreational Symbology (Arizona, Oregon, Washington Office, Wyoming)

In the past few years, cartographers at the Center and printing specialists from the National Business Center (NBC) had noticed inconsistencies in the use of recreational symbology and associated definitions in the Bureau's printed products (maps, booklets, resource management plans). On further review, it was discovered that the problem was more widespread—not only was it a problem Bureauwide, but also throughout other Federal agencies.

As a result of this discovery, Center cartographers are participating on a working group with staff of the Bureau's Arizona, Oregon, and Wyoming State Offices and other agencies to develop recreational symbology that will become the standard symbol-set for use in publications produced by all agencies of the Federal government. Once the working group has agreed on the recreational symbology to be used, it

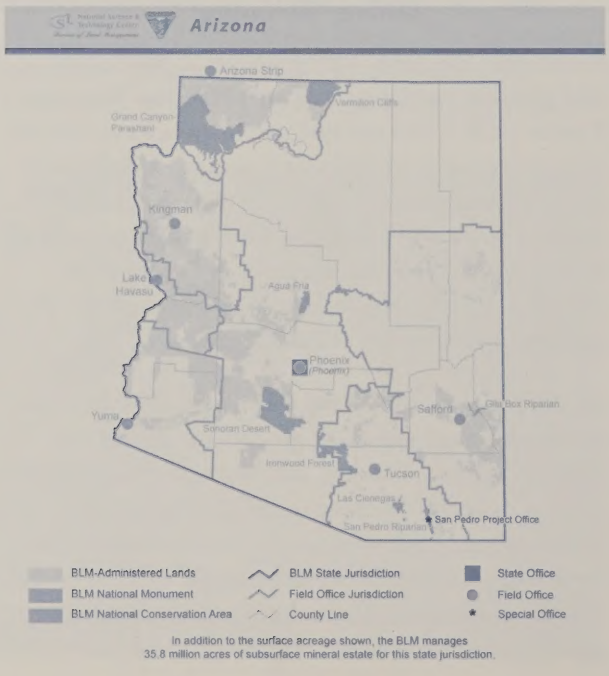
will be developed in truetype fonts and converted into symbol-sets for ARC/INFO, ArcView, and Adobe Illustrator applications. These symbols will also be available for download from the Center Web site.

Because both traditionally and digitally produced maps are often combined with recreational brochures to create cost-effective publications (printed on both sides), successful merging of products will be dependent on the widespread use of the standards throughout government organizations.

Client and office: Ed Harne, Washington Office
NSTC project participants: Peter Doran, William L. Jackson, Tom Noble, Chris Smith
Partners: Lee Campbell (Bureau National Business Center), National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Bureau of Indian Affairs, U.S. Bureau of Reclamation, Department of Highways, Department of the Army, and Amtrak

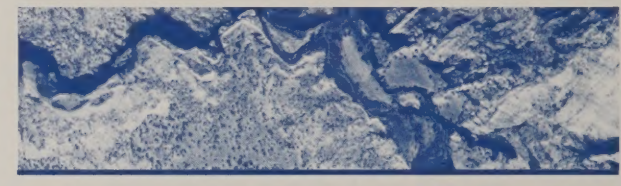
Center Web Map of Bureau Administrative Jurisdictions (Washington Office)

The Bureau's 3-foot x 4-foot map of its administrative boundaries has been revised and reprinted many times. Recently, however, the Center has received many requests from within the Bureau, other government agencies, and private individuals for smaller versions of the map and for the actual digital data. To reduce the staff time required to fill these requests and, at the same time, deliver a quality product in a timely manner, this information has been made available through the Center Web page (***http://www.blm.gov/nstc/jurisdictions/***).



By using the Web as a medium, more information is available with just the click of a mouse than can be provided by a traditional printed map. The information is available in PDF format, and digital spatial data can be downloaded in ARC/INFO export coverage or ArcView Shape (zipped). A visual information specialist and webmaster from the Center prepared the maps for online serving.

Client and office: Washington Office and National Science and Technology Center
NSTC project participants: Keith Francis, Randy Hayes, Jennifer Kapus



Photogrammetry: A Closer Look at Resource Issues

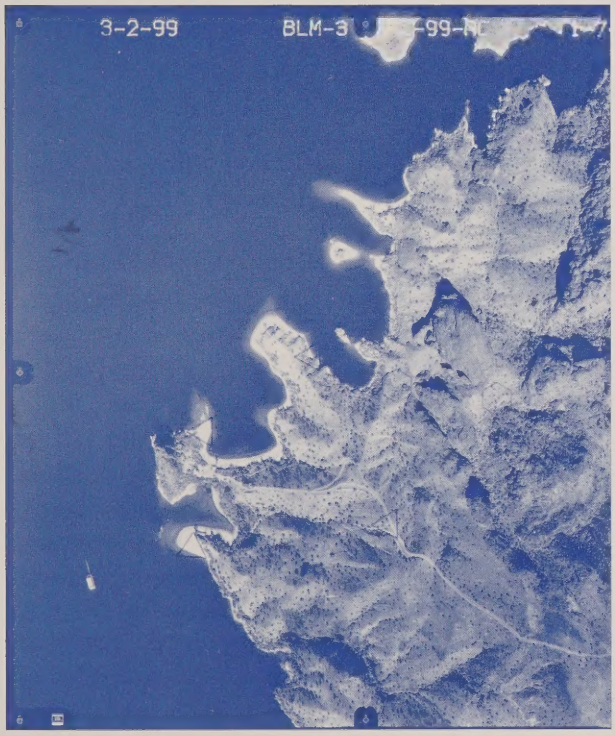
Staff of the National Science and Technology Center provide technical support to Bureau offices in using aerial photography and digital images to map and measure features associated with Bureau-managed resources. This support includes the ability to specify and monitor aerial acquisitions, prescribe the required control, perform the analyses to meet specific customer needs, and manage the archive of Bureau-owned aerial photography. Center personnel also provide photogrammetric support for deferred maintenance requirements. Highlights of work accomplished in FY 2001 follow:

Lake Havasu Recreation Sites (Arizona)

The eastern side of Lake Havasu in Arizona has more than 100 boat-in campsites along nearly 20 miles of shoreline. Many of the restrooms that serve

these campsites, as well as the campsites themselves, are threatened by severe shoreline erosion. In an ongoing, multiyear effort, the Center is providing terrain maps of many sites along the lake so that Lake Havasu Field Office personnel and the Arizona State Office zone engineer can plan improvements for the facilities. The maps may also be used to obtain waivers from State health regulations when the proposed restroom facilities do not meet setback requirements. The maps consist of a grid of elevation (x, y, z) points spaced at a sufficient interval to allow generation of 1-foot contours. These data fields provide users with flexibility in portraying the data in different ways for individual applications. The maps also contain locations of specific features such as ramadas, grills, tables, outhouses, and existing shoreline improvements.

Client and office: Bill Parry, Lake Havasu Field Office, Arizona
NSTC project participants: Paul Graves, Dave Kett, Tom Noble



Vekol Valley Road Improvements (Arizona)

The Center assisted engineers at the Arizona State Office with a road improvement project that will provide better access to the new Sonoran Desert National Monument south of Phoenix. The existing road in the Vekol Valley area has many at-grade drainage crossings that often become impassible during times of high water flow. Center staff created detailed terrain maps for about 30 of these sites along 10 miles of road. Center personnel also coordinated the contract for the acquisition of aerial photographs of the area. Because of the tight schedule for the project, Center photogrammetrists used several different methods for producing the maps, such as digitally scanning aerial photos and then extracting the terrain data using automated terrain correlation software on a digital workstation. Data for other sites were collected using traditional photogrammetric methods on analytical stereoplotters.

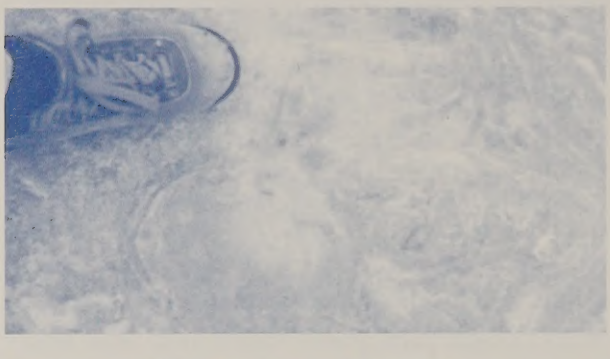
Client and office: Sedrick Green, Arizona State Office
NSTC project participants: Paul Graves, Dave Kett, Tom Noble

Photogrammetric Mapping of the Collet Wash Tracksite at Grand Staircase–Escalante National Monument (Utah)

The Collet Wash Dinosaur Tracksite is located approximately 20 miles south of the town of Escalante, Utah, along Twentymile Wash. The tracks are preserved in Middle Jurassic Entrada Sandstone. Only a few tracksites of this age exist worldwide and, as a result, the site has global scientific value and high interpretive possibilities. Because the Collet Wash Dinosaur Tracksite is open to the public, management issues for the site center on protection and documentation of the important paleontological resources located there. In addition, interpreting the site for the public is of vital importance. However, with increased visitation, the threat of erosion and other negative effects also increases.

Managers of Grand Staircase–Escalante National Monument (GSENM) requested the Center's help in capturing the value of this unique site through photographic and spatial documentation. Aerial photography, at a variety of scales, will be integrated with precise ground measurements to produce an orthorectified digital photomosaic of the track-bearing surface. This digital photomosaic will be spatially

corrected and can be used in a geographic information system environment to digitize the locations of individual dinosaur tracks at the site. The digital photomosaic can also be used in the field as a base map to collect other information from the track surface, enabling the development of an interpretation of Middle Jurassic events. This documentation will preserve the visual value of this unique dinosaur tracksite for the future.



Client and office: Alan Titus, GSENM
NSTC project participants: Neffra Matthews, Tom Noble

Technical Guidance and Support of the National Off-highway Vehicle Strategy (Arizona, California, Colorado, Montana, Washington Office)

With the increasingly high profile of off-highway vehicle (OHV) activities on public lands, many Bureau offices (Phoenix Field Office, Arizona Strip Field Office, Montana State Office, Lower Snake River District Office, Colorado State Office, and California State Office) have requested technical assistance from the Center in mapping existing routes. Center staff, with the concurrence of the Washington Office Recreation Group, prepared an information bulletin (IB) to provide guidance for field offices preparing route inventories. The IB presents proven methodologies that will provide a consistent and defensible inventory when reviewed by Bureau partners and constituents. The methodologies outlined in the IB have been used throughout the Bureau and have been met with acceptance by both field specialists and the general public.

In other OHV program support, a supervisory cartographer from the Center serves as a technical liaison to the Bureau OHV Strategy Team. Center cartographers are also preparing a prototype 1:100,000-scale OHV map at the request of the Wyoming State Office. This prototype will be shared with the Washington Office and State OHV leads and may be used as a template for other States.

Client and office: Washington Office and multiple State and field offices
NSTC project participants: Fred Batson, Paul Graves, Russ Jackson, William L. Jackson, Neffra Matthews, Nancy Russell, and Chris Smith

Integrating Geographic Information Systems Technology With the Visual Resource Management Inventory Process (Arizona, Utah, Washington Office)

Visual Resource Management (VRM) is the process used by the Bureau to identify and protect visual values on public lands. Visual values are developed by completing an inventory of the natural landscape for the purpose of resolving issues through the resource management plan (RMP) process, or for areas where a surface-disturbing project is proposed and a visual resource inventory does not exist or needs to be updated. The Center's assistance was requested by the Washington Office Recreation Group to improve inventory procedures used by field offices.

Technical Note 407, *Integrating GIS Technologies With the Visual Resource Management Inventory Process,* updates the VRM inventory process by using advances in geographic information systems (GIS) and image processing technologies to enhance the repeatability of VRM results, reduce the cost and the time needed to conduct an inventory, reduce the workload that a VRM inventory has on the local office, and improve the quality of VRM inventories for land management decision makers.

By providing this information in printed or electronic format, it can be distributed quickly to a wide and diverse audience. Technical Note 407 is available in hard copy and on the Internet.

Client and office: Rodger Schmitt, Washington Office
NSTC project participants: Russ Jackson, Jennifer Kapus, Kathy Rohling

Partners: Chris Horyza, Phoenix Field Office; Stu Jacobson and Jerry Sempek, Utah State Office

Data Analysis Support for the National Petroleum Reserve—Alaska (Alaska)

The National Petroleum Reserve—Alaska, which encompasses 23 million acres, is the largest block of federally owned land in Alaska and the largest piece of undeveloped Federal land in the United States. Originally set aside as the Naval Petroleum Reserve by President Harding in 1923, the Reserve came under Bureau management in 1976 with the passage of the Naval Petroleum Reserve Production Act.

The Alaska State Office, along with the Washington Office, asked the Center for help in establishing long-term monitoring procedures and baselines for evaluating the environmental effects of oil and gas exploration and development on the reserve. Center staff evaluated potential sources of information, including classified data, and the appropriate tools to exploit that information. Methods were developed to provide timely and concise information in a standard format that met the needs of field specialists and managers. It is anticipated that the Center's assistance will be requested for further refinement of procedures as data sources and tools evolve and become routinely available.

Client and office: John Payne, Alaska State Office
NSTC project participants: Russ Jackson

Geo-Positioning Selection Guide Update (Washington Office)

In 1993, the Bureau published Technical Note 389, *The Geo-Positioning Selection Guide for Resource Management,* to provide guidance to field office personnel and managers in selecting the appropriate geopositioning tool for help in managing the public lands. The technical note was a great success and received wide distribution throughout the Bureau, other agencies, the private sector, and educational institutions.

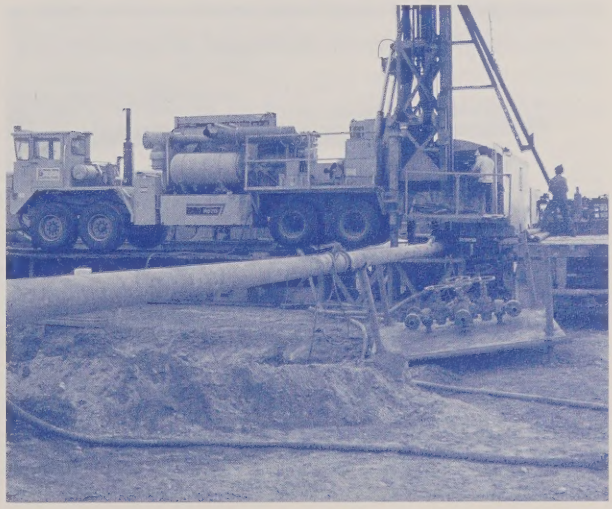
With the rapid increase in the number and types of geopositioning tools available today, the Washington Office Planning, Assessment, and Community Support Group requested assistance from the Center to coordinate an update of the selection guide. The intent is to describe the present state of the geospatial technology industry and how it relates to resource management. Issues related to planning starts, OHV mapping, weeds, wildfire, and other areas require that the Bureau have the most recent and accurate information on the tools available to support these efforts. Work is under way in the development of this update.

Client and office: Ed Harne, Washington Office
NSTC project participants: Peter Doran, Linda Hill, Russ Jackson, Tom Noble

Locating Coalbed Methane Seeps by Using Remote Sensing (Nevada, Wyoming)

The recovery of coalbed methane (CBM) gas is becoming a rapidly developing industry in the West. Along with CBM production has come a growing concern about the gas seeping from the ground into private residences. However, these seeps can also indicate the location of pockets of gas that could prove to be a valuable resource. The process of removing CBM has been known to cause underground fires in local coal seams. To identify previously unknown CBM seeps or burning coal seams, the Wyoming State Office requested that the Center investigate whether remote sensing tools could be used to detect CBM seeps or burning coal seams near Gillette, Wyoming.

Acquisition of all the data and imagery has been completed and analysis has begun. A photogram-



metrist and a remote sensing specialist are evaluating a variety of imagery, including hyperspectral and thermal-infrared imagery and National Aerial Photography Program color-infrared photography. A map product has also been requested for delivery in 2002. By combining resources, a privately owned hyperspectral sensor (Aurora Sensor) provided data not only to the CBM project at the Center, but also to the Nevada State Office, NIFC, and two Nevada Bureau Field Offices.

Client and office: Ed Heffern, Wyoming State Office
NSTC project participants: Nancy Russell and Melinda Walker
Partners: Larry Hamilton and Ken Reninger, NIFC; Sandy Gregory and Kevin Hull, Nevada State Office; Joe Senftle, Advanced Power Technologies, Inc., Washington, D.C.

Science Investigations: What's New in Science

Staff of the National Science and Technology Center (Center) conduct science investigations in support of land and resource management decisions. These science investigations can entail working with research institutions or agencies or assimilating existing information. Personnel are involved in identifying, assessing, and synthesizing information relevant to Bureau management issues identified by field offices, State offices, the Washington Office, and others. Center disciplines include geology, plant ecology, wildlife ecology, wildlife diseases, outdoor recreation planning, land use planning, and other natural resource sciences. In FY 2001, Center staff were involved in many initiatives and projects, including (1) the development of a Bureau science strategy, (2) the development of National Landscape Conservation System (NLCS) science plans to support unit land use plans, (3) a study to determine the employment and income attributable to Bureau-oriented recreation in the Western States, and (4) an analysis of reference areas (lands that best represent the potential of an ecological site in both physical function and biological health) for the Great Basin Restoration Initiative. Highlights of work accomplished in FY 2001 follow:

Bureau Science Strategy and Implementation (Bureauwide)

The Bureau of Land Management Science Strategy (Bureau of Land Management 2000) was completed and signed by the Bureau Director in September 2000. The Strategy was written and revised by a multidisciplinary team that included field office technical specialists, field office managers, State office representatives, a State Director, Science Advisory Board members, Washington Office representatives, Center representatives, and Science Coordinating Committee (SCC) members. The emphasis of the Strategy was to develop an expanded concept of science in the Bureau and a process for identifying the science issues, needs, and projects to support decision making. This year, the SCC and the Center have been developing the regional science catalogs called for in the Strategy, including the issues and needs for each region. This information is being compiled for internal use, to promote science needs to potential researchers and partners, and to serve as preliminary budget tools in the identification of future projects.

Client and office: Henri Bisson, Renewable Resources and Planning
NSTC project participants: Lee Barkow, Phil Dittberner, Brian St. George, Charisse Sydoriak
Partners: Bob Bennett, Chris Gordon, Mark Stiles, U.S. Geological Survey; Science Advisory Board members; Science Coordinating Committee members

National Landscape Conservation System Science Plans (Arizona)

Center staff are in the process of developing a science plan template for use by National Landscape Conservation System (NLCS) units as a component of their Resource Management Plans (RMPs). Science plans establish an analytical process for identifying management issues, information needs for addressing the issues, and a framework for tracking

local science activities. Because many NLCS units were designated to protect scientific attributes, it is important that each unit have a plan to identify and guide its scientific mission and efforts. The Center is developing this prototype science plan in conjunction with Grand Canyon–Parashant National Monument as a template that can be applied across diverse NLCS units.

The science plan will assist unit managers in making more informed responses to requests for land or resource use within their NLCS units and will enable managers to better determine which activities meet land use objectives. The plan will comply with unit-specific issues and will contain standards and guidelines for using, permitting, cataloging, and monitoring science on public lands according to parameters defined in the Bureau's Science Strategy.

The implementation of science plans provides NLCS units with several benefits. Because they are developed in conjunction with each unit's RMP, NLCS units will benefit from additional assistance in gathering information, strategic guidance, and critical review of planning documents. Additionally, science plans present standards and guidelines for using, permitting, cataloging, and monitoring science on public lands. In the course of cataloging management issues and science needs, unit managers are building a foundation for future budget justifications, identifying management issues, scheduling projects, and articulating project deliverables.

Client and office: Grand Canyon–Parashant National Monument, Arizona
NSTC project participants: Vicki Josupait, Brian St. George

Employment and Income Attributable to Bureau-oriented Recreation in the Western States (Washington Office)

In 1999, the Bureau initiated an assistance agreement with the University of Wyoming to assess the economic effects recreation has had on public lands in the Western United States. University staff used the IMPLAN input–output modeling system to carry out State-level analyses that indicated that, in 2002, recreation on Bureau lands in the Western States generated almost 16,000 jobs and more than $295 million in income. This information will be helpful in assisting managers to make more informed land use decisions. Additionally, communities can use these findings in developing viable and sustainable economic options when making a transition from extractive-based local economies to less extractive economies.

This study is a first step in assembling economic information to help describe the importance of recreation on Bureau lands in the Western States. As additional expenditure data and improved recreation use data become available, they will serve as a baseline to determine the value of recreation in the West and will assist the Bureau in achieving its mission to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Client and office: Ann Aldrich, Washington Office
NSTC project participant: Vicki Josupait
Partner: Loren Cabe, Washington Office

Reference Areas for Sagebrush–Steppe Restoration (Colorado, Nevada, Wyoming)

Land Health Standards, BLM Handbook 4180-1, calls for the use of reference areas in determining land health. Reference areas, as defined by the Bureau, are "lands that best represent the potential of a specific ecological site in both physical function and biological health." Reference areas are used as a comparative baseline for determining success in meeting ecosystem restoration goals.

This reference area project was initiated in response to concerns about the definition and application of reference areas as called for in BLM Handbook

4180-1. The objectives of the project are to define the concepts of reference areas and reference conditions within the ecological context of sagebrush–steppe ecosystems and to develop meaningful criteria by which field managers select reference areas. Reference areas can then be used by project leaders to set realistic restoration or treatment goals and to determine progress toward meeting those goals.

Specific project field sites were selected in fall 2001. Bureau Field offices in Colorado, Wyoming, and Nevada were invited to participate in this project.

In preparation for field studies, a literature review was conducted by Center staff to discover the general science issues and questions associated with reference areas and to discover previous work on reference areas as applied to the sagebrush–steppe ecosystems. Although the results suggest that the concept of reference areas is well developed for forested areas, little work has been done on reference areas in shrub–steppe ecosystems.

Clients and offices: Great Basin Restoration Coordinator and Bureau field offices in the Great Basin, Wyoming Basin, and other sagebrush–steppe areas
NSTC project participant: Bruce Van Haveren

Science Applications: Using Science to Manage the Land

The National Science and Technology Center is multidisciplinary, providing consultation and analytic skills pertinent to resource management issues and questions. Personnel strive to transfer scientific methods and applications to Bureau employees through training, publications, and demonstrations. Specialists adapt scientific research and technical applications for use in collecting and analyzing information required for land-use decisions. Expert knowledge of stream systems, riparian areas, and upland sites is applied to range and forest public lands. During FY 2001, Center staff supported the Bureau's field offices, National Training Center, and Washington (D.C.) Office in developing technical guidance documents, implementing the Center's science initiatives, and conducting numerous site-specific consultations. Center personnel offer skills in assessing soil, forest, range, riparian, and stream health. Services were also provided in groundwater analyses and terrain-geographic modeling. Highlights of work accomplished in FY 200l follow:

Salt Creek Evaluation (Oregon)

The objective of this FY 2001 project was to analyze off-road vehicle effects on a stream channel and riparian areas in an arid ecosystem. Salt Creek, a tributary to the Colorado River, is located in the southeastern portion of Canyonlands National Park (Park), near Moab, Utah. The stream provides extensive year-long surface water and a riparian–wetland community in the Park. Since 1953, the Creek streambed has been used as a four-wheel-drive route. The results of a recent legal action taken by off-road user groups has resulted in a Park decision to prepare an environmental assessment of the effects of travel in Salt Creek. Consequently, the National Park Service requested that the National Riparian Service Team (NRST) assist them in analyzing whether various access alternatives would cause impairment to

Park resources. The Center's fishery biologist, as a member of the NRST, assisted in this analysis. The interdisciplinary team performed an extensive assessment of the streambed and related areas and released a draft report of their findings to Park management. The report, titled *Salt Creek Proper Function Condition Assessment,* specifically discusses the results of applying proper functioning condition assessments to address the effects of motorized travel on the physical functionality of Salt Creek's riparian–wetland resources. The results and management options address riparian conditions, recreational vehicle use, and vegetation management. The report was submitted to the Park manager in September 2001 for use in the pending environmental analysis document.

Client and office: Wayne Elmore, NRST, Prineville Field Office, Oregon
NSTC project participant: Don Prichard
Partners: National Park Service, Natural Resource Conservation Service, U.S. Forest Service

Table Mountain Fire Assessment (Nevada)

In the Table Mountain Fire Assessment project, which began in 1997, participants analyzed the effects of fire on watershed condition and assessed the risks of extreme flooding. The Table Mountain Fire occurred in summer 1997 within the Table Mountain Wilderness Study Area in Nevada. Because of the wilderness character of the area, a management decision was made to use limited fire-suppression activities. A total of 8,500 acres were burned. Significant thunderstorms that produced flooding in two major drainages followed. A Center hydrologist and physical scientist, in conjunction with other agencies, provided in-depth analyses of precipitation data and flood magnitudes and assessed the risks of excessive runoff. Specifically, they quantified the change in runoff for the burned area as a function of pre- and postfire watershed conditions. The report *Table Fire Watershed Impact and Risk Assessment* was completed and submitted to the respective Bureau field office.

Data summaries and rainfall and runoff model results were presented in a final report in FY 2001. Similar studies are needed in other fire–watershed situations to develop predictive capabilities. Further work has been proposed through the Joint Fire Sciences Program.

Client and office: Gary Medlyn, Ely Field Office, Nevada
NSTC project participants: Scott Archer, Jim Fogg
Partners: National Climatic Data Center of the National Oceanic and Atmospheric Administration, U.S. Army Corps of Engineers, U.S. Geological Survey

Pinedale Anticline Groundwater Monitoring Plan (Wyoming)

In this monitoring plan, an approach was developed for monitoring groundwater effects from new natural gas well development within the Green River Basin of southwestern Wyoming. Both a preliminary assessment of hydrogeology and the development of a draft monitoring plan were requested by the Pinedale Field Office. Before groundwater monitoring plan implementation, it is necessary to gain knowledge of the groundwater flow system, which includes geologic and aquifer characteristics, existing wells, water quality, and gas development potential. This information becomes part of the monitoring data for the field. The Center's geohydrologist met with the Pinedale and Rock Springs Field Office staffs as well as with company representatives and assisted in the analysis of groundwater issues, resulting in a draft ground and surface water monitoring plan to be implemented as part of the Environmental Impact Statement (EIS) record of decision for leasing.

As part of the EIS record of decision, the monitoring plan will help expedite natural gas development while protecting surface and groundwater resources by outlining conditions of development that are agreed upon by all parties. This planning effort was exceptional because it will be agreed on by six different companies developing the natural gas field.

This prototype plan can be used to help expedite the development of natural gas reserves while working cooperatively with industry to protect valuable water resources. The plan can be used as a framework for setting water monitoring requirements in other conventional natural gas development areas. The draft has been reviewed by the gas field operators and an agreement for the level of investigations has been reached. Implementation of the plan has been legally challenged, however, and is presently on hold pending resolution of how to proceed under the guidance of the court.

Client and office: Phil Howland, Pinedale Field Office, Wyoming
NSTC project participant: Paul Summers
Partners: Dennis Doncaster, Rock Springs Field Office. Representatives from County government, local ranchers, environmental agencies, and gas field operators provided advice and document review.

Forest Vegetation System Installations (California, Colorado, Montana, New Mexico, Oregon, Washington, Washington [D.C.] Office, Wyoming)

The objective of the Forest Vegetation System installations project was to install and train field office employees on the revised database and NT-based interface of Forest Vegetation Inventory System (FORVIS). The FORVIS enables field offices to manage and analyze their respective forest inventory data. The Center's forester provides expertise on inventory protocols and data management. Specifically, assistance was provided to aid field offices in managing their data records and, in particular, historically collected data. Database installations were completed in Oregon, Wyoming, Montana, and New Mexico. Efforts are presently under way to install the database in Colorado. Legacy data were converted and loaded in Wyoming, Montana, and Colorado. With assistance from field office personnel, a Microsoft Access user interface to the Informix database was developed. This NT-based user interface program was installed in the Albuquerque, Spokane, Baker City, Rawlins, and Worland Field Offices. As a second part of the interface development, a contractor was employed by the Center to complete an ArcView FORVIS extension.

This year's installations and modifications resulted in significant advancement in the overall management of the Bureau's forest inventory data. The Washington Office has been supportive of these efforts and has encouraged establishing FORVIS as a national data system.

Client and office: Rick Tholen, Washington Office
NSTC project participant: Bill Williams
Partners: Jim Cunio, Canon City (Colorado) Field Office; Allen Gardner, Spokane (Washington) Field Office; Bill Hensley, Montana State Office; George Phillips, Rawlins (Wyoming) Field Office

Ecological Site Technical Reference Development (Washington Office)

The objective of this project was to update the technical procedure for conducting ecological site inventories on public rangelands. The Center's Rangeland Management Specialist led a team to revise outdated standards (i.e., National Range Handbook) and to produce a new technical reference. Bureau Technical Reference TR-1737-7 has been completed and is being published.

The need for ecological site inventories on public rangelands was mandated by Congress in the 1976 Federal Land Policy and Management Act (FLPMA). In particular, FLPMA requires the Bureau to develop and maintain an inventory of range conditions and trends on public rangelands. The standard method of vegetation inventory is the Ecological Site Inventory, which is patterned after the Natural Resource Conservation Service's vegetation inventory method. This standard involves the identification and mapping of unique soil–vegetation units and the collection of individual species production data.

This effort concludes an initiative begun several years ago. Future work is needed to establish and maintain vegetation databases for ecological site information.

Client and office: Tom Roberts, Washington Office
NSTC project participant: Ned Habich
Partner: Natural Resource Conservation Service

Virgin River Habitat Model Comparisons (Arizona, Nevada, Utah)

The objective of this project was to improve confidence in estimating Virgin River fishery water flow requirements by comparing results and assumptions from three independent habitat model operations. In 1992, the Bureau initiated an instream flow study on the Virgin River from locations near Saint George, Utah, downstream to Lake Mead in Nevada. This interdisciplinary study included an assessment of habitat requirements of several warmwater fish species, including species that are rare or endangered. In particular, data collection and analysis adhered to the physical habitat simulation model developed by the Fish and Wildlife Service in 1989. The hydraulic portion of the model was developed on the basis of a fixed-bed channel with relatively coarse substrate. Because of the nature of the Virgin River's sand substrate and associated channel mobility, which potentially violated the model's assumptions, applicability of the modeling results was questioned. The Center and others were requested to develop and conduct a comparative model output study using expert sources outside the Bureau. This study was initiated in 1997 and included independent model runs using corresponding assumptions developed by experts. In May 2001, a report titled *Comparative Analysis of Aquatic Physical Habitat of the Virgin River from Southern Utah to Lake Mead* was completed and distributed to customers.

The findings of this report show that the independent model results were similar to the Bureau's initial model results. The implications are that streams, which exhibit conditions similar to those of the Virgin River, can be successfully modeled by using this particular approach to habitat modeling. It is expected that this report and related data will be used in the establishment of flows required for fish species in the Virgin River.

Client and office: Ron Hooper, Arizona State Office
NSTC project participants: Jim Fogg, Steve Swanson
Partners: U.S. Geological Survey, Utah State University

Water Erosion Prediction Workshop (Oregon)

The objective of this project was to assess State-specific needs and develop an agenda to deliver a water erosion prediction workshop. At this interactive, hands-on workshop held March 20–21, 2001, in Salem, Oregon, an overview was presented and applications of the Water Erosion Prediction Project (WEPP) model were provided. WEPP is a leading-edge, process-based water erosion model that calculates erosion, sedimentation, and runoff rates on an average annual or probability-of-occurrence basis for climatic events during a given number of years. The hillslope and watershed versions—as well

as the X-DRAIN, WEPP:Road, and Disturbed WEPP interfaces—were presented. The Center's soil scientist worked with others in the Bureau and from other agencies. The workshop is designed to prepare participants to independently operate the model on completion of the workshop. The goal of the workshop is the transfer of this technology to Bureau and other Federal employees to enable them to apply what is considered by peers to be the best science available in erosion prediction modeling. This was the fifth in a series of WEPP workshops that the Bureau has developed and organized. Almost 60 Bureau and more than 40 other Federal agency employees have participated in the workshops. A recent survey revealed that more than half the participants are using the WEPP model for environmental assessment, land use planning, project design, and other uses.

Client and office: Cliff Fanning, Oregon State Office
NSTC project participant: Bill Ypsilantis
Partners: U.S. Forest Service, Agricultural Research Service; Natural Resource Conservation Service

Environmental Compliance: Toward a Better Natural Environment

In FY 2001, staff of the National Science and Technology Center assisted personnel of other Bureau offices in meeting their cleanup and restoration goals and environmental compliance responsibilities. Center staff provided the following environmental compliance services to its clients in FY 2001: evaluating and cleaning up hazardous waste sites; recovering funds and avoiding higher costs associated with hazardous waste-site cleanup, restoration, and resource injury; assessing and restoring natural resources damaged by hazardous wastes; monitoring and resolving air and water quality issues related to the public lands; advising on compliance with environmental laws and regulations; and providing environmental contracting support. Highlights of work accomplished in FY 2001 follow:

Manning Canyon Tailings Engineering Evaluation and Cost Analysis and Cleanup Design (Utah)

The objective of this project was to complete an analysis of alternatives for cleaning up the site, selecting an option that would reduce risks to acceptable levels in the most cost-effective way, and designing the selected cleanup actions.

The Manning Canyon tailings site poses significant risks to human health and safety and the environment from the release of arsenic and other contaminants. This abandoned mine lands site near Fairfield, Utah, contains more than 700,000 cubic yards of tailings in the canyon bottom. The site itself is a heavily eroded, denuded moonscape that attracts many off-road vehicle visitors. The tailings average about 5,000 ppm of arsenic, and they have migrated 3 miles downstream into the small town of Fairfield. The EPA removed yard soils with greater than 500 ppm of arsenic; however, further site cleanup is required.

Center staff completed an Engineering Evaluation and Cost Analysis and also wrote the Action Memorandum that selected the remedy for the site. This remedy involves removing the tailings from the floodplain and storing them in an onsite repository. The dry gulch channel will be restored to handle a 500-year flood. The Center oversaw the Bureau of Reclamation's design in June 2001. In 2002, a construction contractor will implement the site remedy.

Client and office: Tim Ingwell, Salt Lake City Field Office, Utah
NSTC project participant: Karl Ford
Partner: Bureau of Reclamation

Sunrise Landfill Characterization (Nevada)

This project will complete a site characterization and assessment of the Sunrise Landfill and surrounding area for the design and implementation of closure actions and long-term monitoring.

The Sunrise landfill is located on the outskirts of Las Vegas, Nevada, and is one of the largest landfills (900 acres) located on public lands. The landfill began operations in 1952 and ceased operations in

1993. The lessee and operator are presently under EPA unilateral administrative orders for violations of Clean Water Act 309 and Resource Conservation and Recovery Act 7003. The lessee and operator are responsible for closure of the landfill.

EPA Region IX requested the Bureau's involvement in onsite characterization efforts to determine the current condition of the landfill for modification of closure requirements. The Center is providing technical oversight of activities at the landfill that encompass characterization of the landfill cover and surface water control, given the geologic/hydrogeologic setting. The latter has presented the challenge of developing a three-dimensional geologic/hydrogeologic model from which EPA can better assess the design requirements of an ongoing groundwater monitoring network required of most solid waste municipal landfills. This effort will continue into FY 2002.

Client and office: Mike Moran, Las Vegas Field Office, Nevada
NSTC project participants: Brent Lewis, Tom Morris
Partner: Environmental Protection Agency

Caselton Mine and Mill Tailings "Potentially Responsible Party" Search (Nevada)

A search is being conducted for a potentially responsible party (PRP) that may be liable for the costs of cleanup and restoration of the Caselton Mine site and for injuries to natural resources as a result of releases from the site. A PRP can be the present or past owner or operator at a site, the arranger for the treatment or storage and disposal of hazardous substances at the site, or a person who transported hazardous substances from the site. It is Bureau policy that a PRP search should be completed at every site where the Bureau conducts a response action. The PRP search process is usually twofold. First, an evaluation PRP search is undertaken, which consists primarily of data collection and title searching. This can be a relatively inexpensive way to identify PRPs and any data gaps that may exist. For more complex sites, a more in-depth baseline search is conducted.

The site itself is an abandoned mine lands (AML) site near Caselton, Nevada, with more than 3,000,000 cubic yards of tailings. The tailings contain arsenic, lead, and other heavy metals that average in the thousands of parts per millions (ppm). These tailings have eroded and migrated downstream into the Meadow Creek Valley. Additionally, the site itself is heavily eroded—supporting little or no vegetation—and generates toxic dust. The site is also used heavily for off-road vehicle recreation. Cleanup is required because the site poses a significant risk to human health and safety and the environment. If a viable PRP is not identified for this site, funding for cleanup will have to come from the DOI Central Hazmat Fund or Bureau appropriations.

The Center completed a baseline PRP search on this site and also coordinated the review of the September 2000 document, "Baseline Potentially Responsible Party Search and Operation Report," with the DOI Solicitor and Bureau staff and managers associated with the site. In addition, the Center drafted information request letters that will be sent to potential PRPs and others who may have significant information pertaining to legal liabilities associated with the site. Future PRP work on the site will be based on information obtained from these letters and review and guidance from the DOI Solicitor.

Client and office: Sue Skinner, Nevada State Office
NSTC project participant: Janet Youngdahl
Partner: DOI Solicitor

Iron Mountain Natural Resource Damage Assessment and Restoration (California)

The objective of this project is to maximize the restoration of Bureau resources affected by mining on Iron Mountain, which is located in northern California northwest of Redding. The hazardous site condition on Iron Mountain is a result of gold, silver, and copper mining from the 1860s to the1950s. Historical mining perforated a sulfide-rich ore deposit, which has produced world-record acid mine drainage resulting in releases of extremely high concentrations of metals. These contaminants have affected creeks, riparian habitat, and reservoirs with-

in the Sacramento River watershed. The Bureau manages lands with riparian and wetland habitat, as well as recreational uses in the area. The National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), and the State of California jointly manage the salmon habitat and populations. The Bureau of Reclamation (BOR) manages the reservoirs and water storage and allocation. Threatened and endangered salmon, water quality, aquatic and riparian habitat, wildlife associated with the habitat, and recreation loss are of concern to the natural resource trustees (trustees). The Bureau, BOR, and USFWS represent DOI's resource interests in this case. The State of California and NOAA are also trustees.

The Center assisted the Bureau hazardous materials lead for California and the Redding Field Office in carrying out the Bureau's trustee responsibilities at this site. In the last year, the Center has participated in many technical and planning meetings, where strategy and the determination of trustee positions have been negotiated and finalized. Center staff served as the Bureau's alternate member on the Trustee Council, the team established by memorandum of understanding that will manage the case and implement restoration. These efforts resulted in a global settlement that resolves all present and future liabilities of the PRP in exchange for payment of $161 million, and includes previous agreements and commitments for cleanups. The consent decree was entered in February 2001. From the settlement of $161 million, the EPA's cleanup process received $150 million and the trustees received $11 million for restoration. The Center will continue to provide assistance with the design and implementation of restoration actions.

Client and office: Chuck Schultze, Redding Field Office, California
NSTC project participant: Paul Meyer
Partners: Bureau of Reclamation, DOI Solicitor, Department of Justice, State of California, U.S. Fish and Wildlife Service

Henson Creek Watershed Water Quality Loading Analysis (Colorado)

A loading analysis of Henson Creek is being conducted to determine which abandoned mine sites within the watershed have the greatest effect on the water quality of Henson creek. The methodology used to conduct this loading analysis is the tracer-dilution technique.

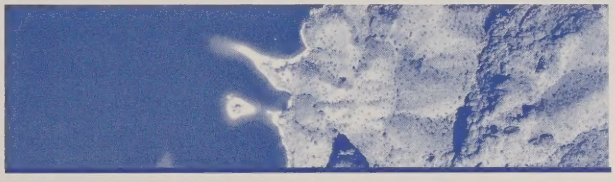
The Henson Creek Watershed is located in southwest Colorado. It has been identified by the Colorado Bureau's Abandoned Mine Lands (AML) program as a high-priority watershed for cleanup because of the effects on human health, safety, and the environment from releases of contaminants associated with hundreds of abandoned mines located within the watershed. The long-term goal of this watershed effort is to clean up mine and mill sites on public lands in the Henson Creek watershed that pose a threat to human health and safety or the environment, or contribute to the degradation of stream water quality. Specific water quality objectives to achieve this goal are being developed on the basis of the results of the watershed and site characterization.

The Center conducted a tracer study in FY 2001 using a tracer-dilution technique for measuring stream discharge while synoptic water-quality samples are being collected. The general approach of the tracer-dilution technique is to measure the downstream dilution of an injected tracer and then use this information to compute stream discharge. Because a conservative tracer substance (sodium bromide) is used, the downstream decrease in concentration is due solely to dilution by inflowing tributaries and groundwater. Multiple discharge measurements can be obtained by measuring the tracer concentration at several points downstream and computing the dilution sequentially from point to point. This represents a considerable savings in time and logistics compared to obtaining multiple discharge techniques by standard (current meter) measurements. Synoptic water-quality samples are collected from the tracer injection reach and from all visible sources (tributaries, seeps, springs, adits) contributing flow to the reach. Chemical analysis includes the tracer, so separate samples are not

required. The combination of flow and chemistry allows loading from identified sources to be computed. Loading from unknown sources such as groundwater can also be computed.

Two tracer studies have now been completed in the Henson Creek basin. The first (August 2000) was done in cooperation with the U.S. Geological Survey. This injection was done on a high elevation tributary, Palmetto Gulch. The second study was conducted by Bureau personnel in August 2001, on a section of Henson Creek. Additional reaches will be analyzed in FY 2002 and 2003.

Client and office: Barbara Hite, Colorado State Office
NSTC project participant: Bill Carey
Partners: Colorado State Office, Montrose (Colorado) Service Center, U.S. Geological Survey



Resource Systems and Remote Sensing/GIS Applications: Getting the Big Picture

Staff of the National Science and Technology Center assisted Bureau personnel nationally in FY 2001 by dynamically examining technological developments and applying necessary technology transfer in support of the Bureau's business operations. With the inherently spatial nature of the Bureau's business, and the focus of Federal government on electronic business applications, the following assistance was provided: determination of a focal point for user input on the Wild Horse and Burro System, Rangeland Administration System (RAS), Grazing Authorization and Billing System (GABS), and Species Tracking System; prototyping and designing GIS applications in support of Bureau programmatic requirements; applying advanced GIS and remote sensing technologies to meet program management needs; assisting national program offices in establishing spatially referenced databases; sharing and examining new developments in technology and applications that benefit Bureauwide operations; and developing and conducting related training. Highlights of work accomplished in FY 2001 follow:

Wetland Delineation for the South Platte Headwaters in Colorado (Colorado)

The Colorado State Office, along with the Royal Gorge Field Office, asked for assistance in identifying critical wetland and fen areas in South Park. Remote sensing techniques (used to determine possible wetland areas in a recent water rights case with the city of Aurora, Colorado) proved promising in assisting with this task.

Landsat imagery and image processing techniques were used to assist in identifying probable wetlands and fens in the South Platte Headwaters watershed. Three separate products for the South Platte Headwaters watershed were provided to the contractor: (1) Tasseled Cap Transformation (a linear transformation that rotates data onto new axes directly correlating to vegetation's physical characteristics); (2) criteria analysis performed on band three of the Tasseled Cap Transformation; and (3) an unsupervised classification to 50 spectral classes. Products were delivered to the contractor, who is using them to target where field work needs to be done. These products will help the contractor optimize time in a large area with a short field season. After collaboration with the contractor, the usefulness of each product in identifying wetlands will be assessed. Plans include performing the same analysis on the North Park area of Colorado in FY 2002.

Client and office: Roy Smith, Colorado State Office
NSTC project participant: Pam Clemmer
Partners: Brad Johnson, Johnson Environmental Consultants, Fort Collins, Colorado

Colorado Vegetation Classification Project (Colorado)

The "Basin-wide Project," as it is known, was started in 1994 to develop a vegetation database from Landsat satellite data and field points for the southwestern corner of Colorado, Montrose District. In 1997, the project was expanded to include the entire

state. The vegetation map being developed will be at a 25-meter resolution and will be classified down to a modified Anderson scheme (a land cover types classification system devised by Anderson et al. 1976). The database is being developed and managed by hydrologic cataloging units or watershed basins, as appropriate. A total of 96 watersheds and pieces of watersheds in Colorado have been grouped into 47 units for the image processing.

To date, 24 watersheds are complete. This is an ongoing, multiyear project with completion planned for FY 2003.

Clients and offices: John Carochi, Canon City, Colorado; Jim Ferguson, Montrose, Colorado; Greg Goodenow, Craig, Colorado
NSTC project participant: Melinda Walker
Partners: U.S. Bureau of Reclamation, Colorado Division of Wildlife, Colorado Department of Transportation, U.S. Fish and Wildlife Service, U.S. Forest Service–Region 2

Rangeland GIS With Extensions (Washington Office)

This project continues the development and enhancements of GIS products in support of rangeland management. Several extensions were developed this year; in addition, enhancements were added to previously developed extensions. The project encompassed several parts:

A. The Rangeland Information System (RIS), version 2, was released this year. An integrated package for the input, storage, analysis, and output of spatial rangeland data, RIS version 2 is a significant improvement over version 1 and is easier for the field office specialist to use. As a result of customer suggestions, two new queries were added, some preexisting queries were enhanced, and new tools and buttons were added and enhancements were made to the existing ones. The online documentation was also improved and put into an Adobe pdf (Portable Document Format).

B. An extension was developed to help field office users convert the Grazing Authorization and Billing System (GABS) and Rangeland Improvement Project System (RIPS) PCFocus files to ARC/INFO data files, thus allowing them to use their most recent GABS and RIPS data with the application.

C. The Ecological Site Inventory Extension (ESIE) is a customized ArcView GIS extension that provides users with more efficient access to spatially view and analyze Site Writeup Area (SWA) vegetation data from the Inventory Data Systems (IDS) database. This extension combines spatial data and tabular data by linking digitized SWA polygons to records in the IDS database stored in Informix, not previously available to Bureau field office personnel. The ESIE is accessible from anywhere on the Bureau network and provides real-time access to IDS data. Custom data queries are provided to enable the user to better understand relationships and glean pertinent information from this rich database. The system enables more accurate planning and reporting of range activities in completing recreation Environmental Impact Statements and management plans, conducting surveys, or as an analysis tool for vegetation manipulations. Also, hard copy map printouts of the themes displayed in the ArcView interface can be generated. Targeted users for this extension are the range conservationists and resource specialists working in Bureau field offices.

D. The Analysis Tools Extension (ATE) was created to provide a simple report writing capability. When an individual uses the Rangeland Information System (RIS), Soils Suitability Extension (SSE), or Ecological Site Inventory Extension (ESIE), query results are displayed in the table of contents of an ArcView window. These results need to be intersected with the area of interest, such as an allotment. Normally, the intersect command intersects only two themes at a time, but with ATE, users can intersect as many themes as they wish within their area of interest. Additionally, the ATE allows the tabular results to be easily copied into WordPerfect or MS Word. Although the concept seems simple, this was a difficult extension to create. This extension will be released on completion of a detailed user document.

E. IDSU/2 converter. For field offices to get their Environment Sensitivity Index (ESI) data into the Inventory Data System (IDS) database, they must calculate the township, range, and section for each Site Write-up Area (SWA). This is a time-consuming process; however, the data cannot be entered into the IDS without this information. IDSU and IDSU2 were created for field offices to input their ESI data without having to determine the township, range, and section of each SWA on a stand-alone PC. Because the data reside at a field office in this PC format, the IDSU/2 extension was developed to intersect digital SWA, PLSS, and land status coverages and create the needed 703 file. This process allows local data from IDSU and IDSU2 to feed the national IDS database. Programming is being finalized and documentation is nearing completion.

Client and office: Tim Reuwsaat, Washington Office
NSTC project participants: Ned Habich, Leon Pack, Mary Beth Stulz
Partners: Bureau Field and State Offices, Programming Specialists

HB (Wild Horse and Burro) User Representative (Bureauwide)

In FY 2001, the Center's user representative of the Wild Horse and Burro Program supported the upgrade of the Wild Horse and Burro Information System. Four sets of upgrades were released, focusing both on fulfilling new reporting requirements and on facilitating use by remote users. The major enhancement was the addition of the Unmarked Animal Maintenance Record, which allows field offices to enter information about animals before they are freeze-marked. Other enhancements include two new standard reports, reworking of the adoption fee and fee-type accounting (competitive bidding in adoption fees; adoptions from capture sites, sanctuaries, and the Internet), and the addition of several enhancements recommended by the Adoption Standardization Team (definition of an adopter e-mail element, documentation of an animal's training, and reflecting an adopter's use of a fee voucher to replace an animal that was returned from adoptive care).

Client and office: Bureau Field Offices, Washington Office
NSTC project participant: Dick Stark
Partner: Bureau's National Information Resources Management Center

Susanville Interagency Fire Center Digital Dispatch Map (California)

For years, the Susanville Interagency Dispatch Center has needed a map for the Dispatch Office—a difficult effort because the area crosses State boundaries and has multiple jurisdictions. Few were able to compile data that were out of their jurisdiction. A new digital map was created that will provide seamless digital coverage of more than 25 layers of data for the entire dispatching region. These digital data will be incorporated into the Dispatch Office's computer-aided dispatching software, WildCAD.

Client and office: Chuck Judd, Susanville Interagency Fire Center, Susanville, California
NSTC project participant: Susan Goodman
Partners: Bureau of Land Management Offices (California and Nevada), California Department of Forestry, National Highway Department, National Park Service, U.S. Forest Service (Lassen National Forest), U.S. Geological Survey (Internet data)

Priority Subbasins Identification Project (Washington Office)

Data sets developed for the Western States were used to identify the subbasins whose ecosystems were at the greatest risk, according to criteria specified in the FY 2001 Annual Work Plan. Examples of these risks are weed infestation, poorly functioning riparian areas, and fire. The results of an analysis of the data were to be provided for review and feedback through an ArcIMS site accessible from the Internet.

As data sets were identified and submitted, the information was prorated to Level 4 hydrological cataloging units and stored as layers in a Spatial Data Engine database. A Web site was established (***http://ncarc.blm.gov/website/psip***) that allowed participants to view the data sets and supply feedback to the programmer. An electronic comment page was also implemented. When the analysis was completed, 143 subbasins were found to contain three or more risks to their ecosystems and were identified as high-priority subbasins. Because some of the data sets were incomplete and many were somewhat general, it is expected that review by the State may result in requests for adjustment of the results.

Client and office: Eric Janes, Washington Office
NSTC project participant: Wendy Bullock
Partners: Washington Office Program Leads

Rangeland Administration System (Bureauwide)

The Rangeland Administration System (RAS) replaced the Grazing Authorization and Billing System (GABS) on September 29, 2001. Since its deployment in 1987, GABS has been used to produce grazing authorization documents such as permits, leases, applications, and bills. It provided a way for Bureau employees to produce and print these documents in their local offices when they were needed, instead of on the weekly schedule provided by the Range Management Automated System that this system replaced.

In contrast with GABS, which was deployed on stand-alone personal computers, RAS will reside on the Bureau Intranet and data will be available to all Bureau users on a real-time basis while providing individual offices with ownership and security of their data. RAS will be deployed in a Windows environment, allowing navigation through various records so users will be able to perform work in the most efficient way for them.

Reports (standard and ad-hoc) will be retrievable at different office levels, thus reducing the number of data calls from State Offices and the Washington Office. For example, a new field ("permit issue date") has been added that will allow the Washington Office and State and field offices to track permit renewal accomplishments in real time and as frequently as needed. The "Application for Grazing Permit Renewal" and the "Exchange of Use Agreement" reports have been added to assist users in processing permit or lease renewals and relating exchange-of-use grazing to the authorizing documents.

System users will no longer order, store, and use special forms that must be printed on impact-type printers, as all forms will be system-generated and printed on plain paper using network or dedicated printers. RAS will be interfaced with the Collection and Billing System, thus eliminating time spent performing redundant data entry and reducing the possibility of errors that duplicate data entry introduces.

Client and office: Tim Reuwsaat, Washington Office
NSTC project participant: Leon Pack
Partner: Leslie Cone, Washington Office

National Technical Means Data for Vegetation and Fuel Model Trend Analysis (Nevada, Wyoming)

This project was undertaken to determine whether it was possible to quantify, by advanced remote sensing techniques, effects over time of prescribed fire in a grassland–shrub environment, to assess success in accomplishing the goals set forth in a burn plan. Commercial multi-spectral imagery (both aircraft-mounted and satellite imagery) was used to determined whether burn plan objectives had been met and, if so, what vegetation currently existed on the site. It was concluded that this question could not be answered by using multi-spectral imagery. A proposal was submitted to and accepted by the Joint

Fire Science Program to continue this line of research using hyperspectral data. The project encompasses the Left Hand Creek study site near Worland, Wyoming, and the Sheldon-Hart Refuge in northern Nevada at the Catnip Mountain study site.

Client and office: Bruce Keating, Wyoming State Office
NSTC project participant: Susan Goodman
Partners: National Park Service, U.S. Fish and Wildlife Service, U.S. Geological Survey

FY 2003 Budget Focus Areas (Washington Office)

Information was gathered to provide an approach to budget packaging for FY 2003. Data were collected for four focus areas—National Landscape Conservation System, Energy and Minerals, Community Growth, and Conservation and Restoration—and made available on the Internet. A Web site display was completed and full access was provided to the Washington Office for review. The Washington Office used the data to support its 2002 budget submission. The site can be accessed at ***http://ncarc.blm.gov/website/budget***.

Client and office: Mike Mottice, Washington Office
NSTC project participant: Wendy Bullock
Partners: Washington Office Program Leads

The Bureau Library: Sharing Knowledge

The Bureau of Land Management is charged with effectively managing the Nation's public lands on the basis of accurate scientific information (BLM Science Strategy 2000). The Bureau Library, located in the National Science and Technology Center, Denver, provides access to current information on technologies, procedures, and studies of importance to Bureau scientists and managers. The Library supports the Bureau with a full range of services, including reference services, interlibrary loans, cadastral survey information sets, and listings of recent publications. With more than 40,000 volumes and 250 periodical subscriptions available for their use, staff are kept apprised of pertinent research and development, applied technology, legislation, and administration. The following Library support was delivered Bureauwide. Highlights of work accomplished in FY 2001 follow:

Literature Searches

Library staff have access to nearly 1,000 databases that contain periodicals, books, reports, conference proceedings, and dissertations. During FY 2001, the Bureau Library performed literature searches resulting in bibliographies used in many Bureau initiatives, including the following:

Staff of the Wyoming State Office requested a bibliography of books, articles, and dissertations dated between 1991 and 2001 on various aspects of the coal industry and its effects in Wyoming. The completed bibliography will be available in printed and CD format.

The Library provided literatures searches on various effects of fire on cultural resources. Bishop Field Office (California) staff compiled these for the Bureau of Land Management Preservation Board. The bibliography was transmitted to all field officials, cultural program leads, and fire management specialists in the July 26, 2001, Washington Office Information Bulletin 2001-131.

The Library contributed bibliographies on the effects of off-highway vehicles (OHV) in support of the Bureau's national initiative. This information was provided to a staff member at the Idaho State Office and to the U.S. Forest Service's National Riparian and Wetlands Program Manager.

Staff of the Moab (Utah) Field Office and the Center requested bibliographies related to bighorn sheep habitat management, land use effects, and radiotelemetry techniques. This information is being used in support of bighorn studies by the Bureau, the Utah Division of Wildlife Resources, the Foundation for North American Wild Sheep, and the National Park Service.

Providing Supporting Documentation

Interlibrary loan services also help support Bureau land management decisions. In FY 2001, the Library filled almost 4,000 requests for books and reports, as well as copies of more than 2,000 journal articles. For example, pursuant to developing a Geothermal Categorical Exclusion List, a number of Bureau researchers and partners are investigating geothermal energy. The Library performed literature searches in various databases and on the Internet. Requests for Library assistance also resulted in the following: (1) When Bureau wildlife and fisheries biologists began writing guidelines for working with U.S. Forest Service and National Marine Fisheries Service cooperators, the Bureau Library provided supporting documents and information. (2) Bureau scientists requested documentation on Bureau policies and procedures regarding the use of pesticides, focusing on information on sensitive fish species. (3) The Library has provided many hundreds of documents for a handbook about riparian plants to be published in cooperation with the Idaho State Office.

Cadastral Survey Information

More than 100 requests for historical cadastral survey information were addressed during FY 2001: (1) In addition to serving Bureau offices, the Center assisted the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the DOI Division of Realty. Requests were also filled for the Colorado Department of Transportation, the Colorado Highway Patrol, the Assessor's Office of Breckenridge, Colorado, and the City of Aurora, Colorado. (2) Private corporation requests came in from Selenite and Crystal Lights, Inc., King Surveyors, Inc., and Premier Data Services, Inc. The Southern Oregon Historical Society and Southern Oregon Genealogical Society were also assisted.

BLM Library Update

The Library provides a BLM Library Update (formerly called Monthly Alert) on the Bureau's Web site that contains a listing of citations from current publications pertaining to natural resources. More than 500 requests generated by publication of this listing have resulted in the delivery of more than 5,500 articles. Presently, 285 Bureau staff subscribe to this service. Most items in the monthly update are reprints of current journal articles or research papers, provided free of charge upon request.

Reference Services

The Library added 435 new acquisitions to the Bureau collection during FY 2001, on diverse topics such as *Wildlife Study Design, Writing Successful Science Proposals,* and *Riparian Management in Forests of the Continental United States.* More than 700 reference questions were responded to, providing such support as information regarding a tribal water boundary dispute, resource materials for designing a bat grate on caves, information regarding abandoned mines, research on Bureau lands boundary adjustments, research on a National Wildlife Refuge, information regarding stock driveway signs, and support in finding out-of-print Bureau documents dealing with hawks.

Web Access to Databases

Beginning in September 1999, the Bureau Library has provided Internet access to the National Agricultural Library's database, AGRICOLA, so that Bureau researchers could identify and find articles pertinent to work activities. Since that time, the Library has added GEOREF, the premiere international resource for information about the geosciences, and ABSEARCH, a wildlife database with citations and abstracts from key journals in the fields of wildlife, fisheries, and avian biology and manage-

ment. Publications and articles chosen from these resources can be acquired by the Library and sent to the requester for use in making policy and management decisions relating to Bureau projects.

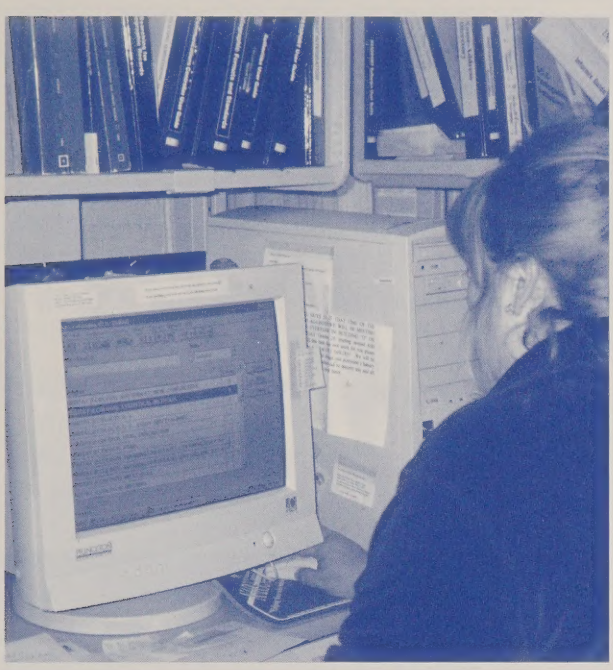


Table of Contents Service

The Library's Table of Contents Service, provided through a private vendor, helps keep Bureau staff informed of current research in their areas of interest. The table of contents from as many as 50 journals designated by the requester are sent electronically each month to the individual's personal computer for perusal. The employee can then request any article he or she wishes to see in full text from the Library.

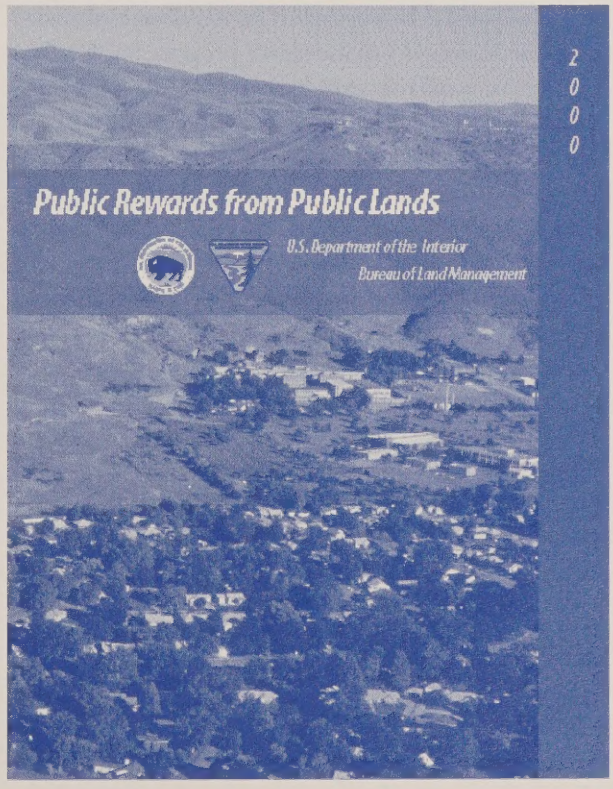
Client and office for all Library services listed: Bureauwide
NSTC project participants: Elizabeth Araki, Barbara Campbell, Kenneth Grace, Barbara Klassen, Nathan Matthews, Joan Penzien, Crystal Talavera, David Woodworth

Publications Support: Delivering the Message

Staff of the National Science and Technology Center provide a full range of publication services—from consultation and planning to coordination of printing and distribution. Working in concert, Center editors and visual information specialists support the production of Bureau technical manuscripts and articles, planning and environmental documents, general interest brochures and pamphlets, newsletters, training materials, exhibits, posters, and other publications. Highlights of work accomplished in FY 2001 follow:

Public Rewards From Public Lands (Washington Office)

The annual report series *Public Rewards From Public Lands* presents the value of Bureau lands in econom-



ic, social, and environmental terms, looking at land management challenges on a State-by-State basis. The Bureau's message reaches out to State and Federal partners, interest groups, and the public. This 12-volume report is also presented to Congress for use in the budget planning process—making timely publication of critical concern. Center staff provided design, layout, and photo coordination for this report, as well as original map illustrations.

Clients and office: Celia Boddington, Rem Hawes, Jeffrey Krauss, Washington Office
NSTC project participant: Jennifer Kapus

Safety and Health Management Handbook (National Human Resources Management Center)

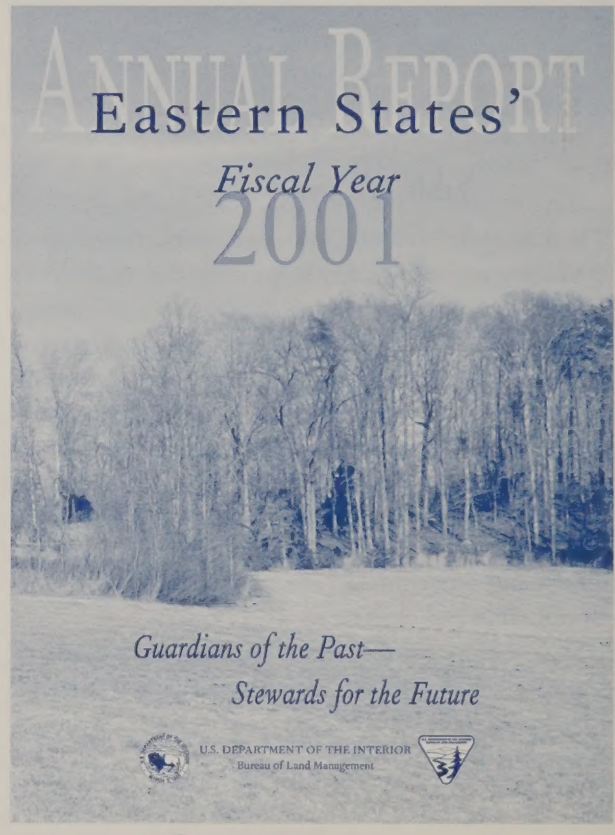
In the "Program Evaluation" section of the *BLM Strategic Plan for FY 2000–FY 2005*, material weaknesses in the Bureau's safety management program are discussed. Center staff provided the publications support to produce an innovative *Safety and Health Management Handbook* that addresses the Strategy's challenge by providing policy and guidance on the implementation of the Bureau's Safety and Health Program. The handbook provides a Bureau standard for the safety program by furnishing guidance on risk management, occupational health hazards, fire safety, motor vehicle and equipment safety, and the use of personal protective clothing and equipment. Center publications staff worked with the safety and occupational health manager from the National Human Resources Management Center to ensure that the document provides clear, useful, and possibly life-saving information for the Bureau's managers and employees.

Client and office: Dick King, National Human Resources Management Center
NSTC project participants: Ethel Coontz, Kathy Rohling

Vantage (Eastern States Office)

At the beginning of the fiscal year, the Bureau's Eastern States Office produced a special edition of *Vantage*, its quarterly newsletter, to summarize Eastern States activities for Congress, interest groups, and customers. The newsletter provided highlights of Eastern States programs, information on funding levels and payments to State governments, and descriptions of partnerships and environmental education activities. Center publication specialists worked with the Eastern States External Affairs Office to ensure that the text was clear, concise, and easy to read. A unique, cost-efficient design was developed by using two ink colors and blending them to achieve a third color for added dimension. The result was an eye-catching document that the Eastern States Office used to notify the public about its accomplishments and to gain support for future activities.

Clients and office: Peggy Riek, Cathy Rodine, Eastern States Office
NSTC project participants: Linda Hill, Janine Koselak



Corporate Metadata Repository (Washington Office)

The Corporate Metadata Repository, or CMR, is an Oracle-based, off-the-shelf software package that stores metadata—data about data—about the Bureau's national applications. The Center was called on to help write and design a CMR brochure and exhibit for display at an Information Resources Management seminar held in May 2001. The data manager for the group indicated that the final products received favorable reviews throughout the Bureau for clearly explaining and illustrating what the CMR is, who could use it, and how it could be accessed by using one of two different tools.

Client and office: Melanie Rhinehart, Washington Office
NSTC project participants: Peter Doran, Kathy Rohling

Wild Horse and Burro Handbook (Nevada)

The Wild Horse and Burro Act of 1971 directs the Bureau to preserve and protect wild horses and burros and to manage for healthy rangelands. When an overpopulation of wild horses and burros exists on the range, excess animals are removed and offered to the public for adoption. The Wild Horse and Burro Program Handbook, *Conducting Compliance Checks for BLM's Wild Horse and Burro Adoption Program*, was written several years ago and, after undergoing a number of reviews, was sent to the Center for editing and layout. Publications staff worked with the National Wild Horse and Burro Program Office in Nevada to reorganize the handbook and rewrite certain sections using a "plain language" approach. Numerous forms and illustrations were incorporated and an appealing cover was designed and created. The handbook outlines the responsibilities of the adopter and the Bureau; explains what compliance checks are, who may conduct them, and when they are conducted; provides compliance inspection procedures; and outlines corrective actions. The handbook is used to train Bureau-authorized officers and their designees on compliance actions and provides an approach that can be used consistently within the Bureau to ensure that adopters are complying with the requirements of the wild horse and burro adoption program.

Client and office: Lili Thomas, Nevada Program Office
NSTC project participants: Linda Hill, Jennifer Kapus

Western Springs Guide (Idaho, Nevada, Washington Office)

Springs have a unique combination of physical, chemical, and biological characteristics that may require individual management prescriptions for maintaining the ecological structure and function of the spring habitat. *A Guide to Managing, Conserving, and Restoring Springs in the Western United States* was developed to provide information on the characteristics of Western springs and to identify techniques for managing spring habitats that will allow their use, maintain biological integrity, and rehabilitate or restore degraded habitats. The guide describes processes for assessing and determining spring management and suggests restoration priorities. Each process builds on an evaluation table to assist managers in making their determinations. Center staff worked with the Fish, Wildlife, and Forests Group of the Washington Office and the Desert Research Institute and University of Nevada–Reno to ensure that the material was presented clearly, the processes were developed logically, and the information in the evaluation tables correlated with the text. A unique design was developed that incorporated drawings of species found in springs and brought out the underlying message of the importance of preserving spring habitat.

Client and office: Jill Silvey, Idaho (Washington Office–Fish, Wildlife, and Forests Group)
NSTC project participants: Linda Hill, Janine Koselak, Don Prichard
Partner: Don Sada, Desert Research Institute and University of Nevada–Reno

Bureau Annual Performance Plan (Washington Office)

Each fiscal year, the Bureau provides the Department of the Interior (DOI) with an Annual Performance Plan and Annual Performance Report for use in strategic planning. To be useful, this large undertaking must be completed in a short time. Design innovations by Center staff helped streamline the report so that it was about 30 pages shorter than the previous year's report. Design staff researched and obtained photographs from other Bureau documents and strategically placed them in the performance report to illustrate text discussions. In-house design of the annual report provided the Bureau with substantial cost savings—especially when last-minute changes were required to reflect the most recent figures for budget planning.

Client: Janine Velasco, Washington Office
NSTC project participant: Jennifer Kapus
Partner: Robert Woerner, National Business Center

Interpreting Indicators of Rangeland Health (Idaho)

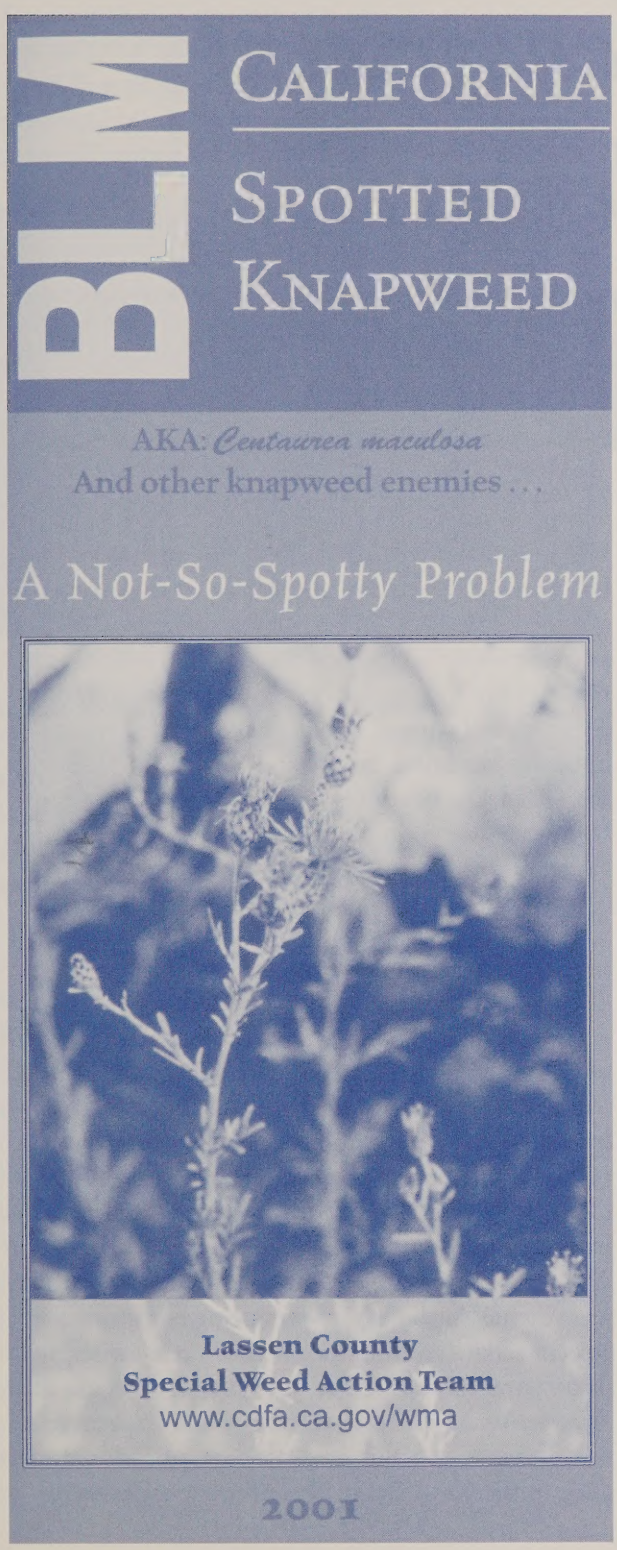
Technical Reference (TR) 1734-6, *Interpreting Indicators of Rangeland Health,* describes a new, qualitative assessment protocol that allows for more consistent interpretations of rangeland health indicators to make assessment results comparable across agency boundaries. The document was produced through an interagency partnership between the Departments of the Interior (Bureau of Land Management, U.S. Geological Survey) and Agriculture (Natural Resource Conservation Service [NRCS], Agricultural Research Service). Center staff contributed to the contents of the report and provided editing, layout, and design support. Ten thousand copies of the document were produced and distributed to Bureau field offices, rangeland consultants, resource specialists, and cooperating agencies. Additional applications of the information in this TR are being researched by the American Farmland Trust for use in prioritizing areas for preservation. The electronic version of the document is accessible through the Center Web site (***http://www.blm.gov/nstc/library/techref.htm***) and the NRCS Grazing Lands Technology Institute Web site (***http://www.ftw.nrcs.usda.gov/glti/pubs.html***).

Client and office: Mike Pellant, Idaho State Office
NSTC project participants: Ned Habich, Janine Koselak, Kathy Rohling
Partners: David Pyke, U.S. Geological Survey; Patrick Shaver, Natural Resource Conservation Service; Jeffrey Herrick, Agricultural Research Service

Invasive Plants Brochures (California)

The presence of non-native, invasive plants are of concern across the Bureau's landscape. Center publication staff provided support to the Lassen County (California) Special Weed Action Team through the Bureau's Eagle Lake Field Office with publication support for a series of four brochures designed to educate the public about the dangers of noxious

weed infestations and how they affect the environment and ecosystems. These brochures describe how perennial pepperweed (*Lepidium* spp.), Scotch thistle (*Onopordum acanthium* L.), spotted knapweed (*Centaurea melitensis* L.), and yellow starthistle (*Centaurea solstitialis* L.) can reduce the biodiversity of native plant communities and rapidly displace other plants that provide habitat for wildlife and food for people and livestock. Illustrations provide identification keys and habitat. This Bureau project was undertaken in partnership with local and Federal agencies, addressing common interests and achieving common goals.



Client and office: Mary Lou West, Eagle Lake Field Office, California
NSTC project participant: Ethel Coontz
Partners: Lassen County Department of Agriculture, California; University of California Cooperative Extension Office; Natural Resource Conservation Service; California Department of Food and Agriculture; Honey Lake Valley Resource Conservation District, California; Robert Woerner, National Business Center

National Science and Technology Center Web Site (Bureauwide)

The Center's Web site continues to be one of the most informative and user-friendly sites in the Bureau. The redesigned site was made available on March 30, 2001, to reflect the changes and mission of the Center. Scientific and technical information about such topics as air quality, ecosystem modeling, soils, biological communities, mapping, and visual resource management is included as well as information on how to access Center services. Many useful links within the Bureau, as well as to other goverment and academic sites, are also provided. Visit the Center's Web site at ***http://www.blm.gov/nstc***.

Client and office: Bureauwide
NSTC project participants: Terry D'Erchia, Randy Hayes, Linda Hill, Jennifer Kapus

Creating Opportunities While Meeting Management Challenges

The Bureau of Land Management shares common goals with many other organizations: the appreciation, conservation, and wise use of the irreplaceable treasures of public lands. Bureau partners have demonstrated their commitment to these objectives through contributions to resource projects, efforts to educate the public about the conservation of public lands, and the donation of materials.

Project Partnerships

Bureau of Land Management Great Basin Restoration Initiative

The Bureau of Land Management Great Basin Restoration Initiative (GBRI) originated in the wake of the disastrous fire season of 1999, in which 1.7 million acres of public land—mostly in Nevada—burned. Today, more than 25 million acres of the Great Basin are dominated by exotic annual grasses and noxious weeds, with additional acres dominated by pinyon pine and juniper. The health of these lands is in jeopardy because of (1) exotic annual grasses (such as cheatgrass, *Bromus tectorum* L.), which are flammable and can increase the incidence and spread of wildland fires resulting in even greater loss of native vegetation and habitat as the exotic species spread; and (2) woodlands dominated by pinyon pine or juniper species, or both, which, as a result of fire suppression, excessive livestock grazing pressure, and climate change, have invaded what once was sagebrush–steppe and sagebrush. Through the GBRI, the Bureau is responding to the need for large-scale restoration to stop the downward ecological trends in the Great Basin area.

The National Science and Technology Center has supported the ongoing Initiative through active participation as members of the team and by providing services and developing various products. Examples of Center support include the following: (1) The identification of the GBRI area and subbasins included producing an objective and definitive means of identifying the geographic extent of the GBRI area. The results of this work provide the basis for common delineation of the GBRI area. (2) General GIS support in preparing mid- to broad-scale digital databases and producing maps and associated analysis outputs for use in team meetings, documents, and other needs. (3) Several specific remote sensing and GIS-related products, such as a broad-scale map that shows the change in cheatgrass areas in the Great Basin. The primary objective of

the task was to demonstrate the extent of this problem through a map showing changes, both increases and decreases, in cheatgrass over time. (4) Support toward developing the GBRI Conservation/ Restoration Prioritization Worksheet for Watersheds. The worksheet is an analytical priority-setting tool that assigns a numerical value to watersheds, depending on the status of resources, risks, and opportunities for restoration. The Center specifically provided criteria for soils and special status species.

Client and office: Sherm Karl, Washington Office
NSTC project participants: Bruce Durtsche, Dianne Osborne, Bill Ypsilantis,
Partners: Federal and State agencies, Native American tribes, universities and colleges, interest groups, Congress, and the public

San Miguel River Basin Study

In the early to mid-1990s, the Upper San Miguel River Basin (Colorado) experienced some of the highest relocation and resort growth rates in the Nation along with a fivefold increase in nonskier recreational uses. This growth lead to rising demands for out-of-channel water use and to a resultant depletion of instream flows. The San Miguel Watershed Coalition was formed to develop a multijurisdictional watershed plan for the Basin. The Coalition includes community groups, local governments, and State and Federal agencies. Coalition work groups have been formed to focus on riparian, recreation, and fisheries issues. These work groups review, prioritize, and provide additional definition to the issues.

One high-priority issue identified by the Coalition's Water Issues Work Group was the protection of resource values associated with the San Miguel Basin's riverine systems. The Bureau was assigned the lead in preparing an instream flow assessment that would be easily understood by and accessible to the public. The assessment was to provide substantive information to facilitate land management decisions for achieving sustainable riverine ecosystems and flow-dependent resource values.

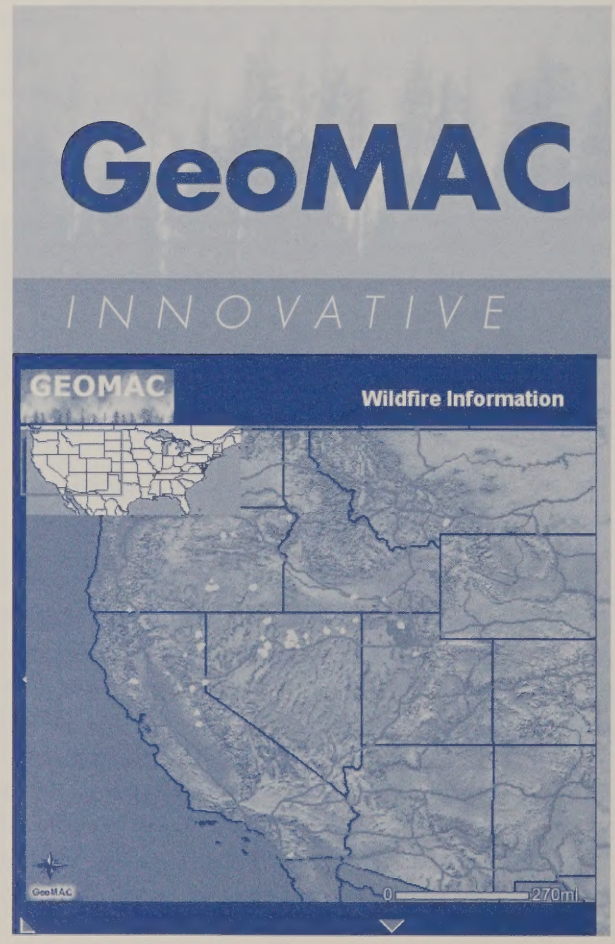
The technical approach used to prepare this instream flow assessment was similar to that used in several other assessments. However, one unique aspect to this particular instream flow assessment was the participation and contributions of the numerous partners involved in the study. Local citizens assisted in collecting meteorological data and also served as observers to alert Bureau personnel when ice flows occurred during the winter. The ice flow part of the study was conducted with assistance from the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory in New Hampshire. The USGS provided analyses of stream flow data from past and present gaging stations on the San Miguel River. The Colorado Division of Wildlife provided assistance with data collection and with modeling to determine the usability of the river for aquatic biota. They also worked with the Center to perform similar modeling for different types of recreational uses. The University of Colorado and Colorado State University assisted the Bureau in assessing the relation between riparian plant communities and groundwater–surface water interactions along the San Miguel River Basin.

The instream flow assessment has been acknowledged as a valuable tool in (1) making recommendations to community leaders and developers to balance growth with available water resources, (2) allowing agencies responsible for management of the riverine system to better understand flow-related limitations for future management potential, (3) providing education to the public on the value of instream flow, and (4) providing data to facilitate instream flow recommendations to the Colorado Water Conservation Board.

Client and office: Dennis Murphy, Bureau Colorado Montrose Service Center
NSTC project participant: Bill Cary
Partners: San Miguel Watershed Coalition, U.S. Army Corps of Engineers, Colorado Division of Wildlife, University of Colorado, Colorado State University, U.S. Geological Survey

GeoMAC: Bringing Wildland Fire Technology to the Twenty-first Century

GeoMAC is a real-time Internet mapping system tool that allows wildland fire managers and the public to pinpoint the location and size of existing wildfires by using geospatial technologies. This system was originally created by the Geospatial Multi-Agency Coordination Group, consisting of the Bureau of Indian Affairs, Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, and National Oceanic and Atmospheric Administration. GeoMAC allows users to manipulate map information on the computer screen by zooming in and out and displaying fire information at various scales. The user can query information on individual fires such as the fire name, current acreage, and other wildland fire status information, and can link to a remote automated weather station's data near a wildfire. Additional data layers such as temporary flight restrictions, wildland fire weather watches, red flag warnings, aircraft hazard maps, and other critical wildland fire analysis information are presently being added to GeoMAC.



The Center participated in GeoMAC by updating wildland fire perimeters daily during fire season. To give wildland fire managers near real-time information, wildfire perimeter data are updated daily according to input from incident intelligence sources, Global Positioning System data, and infrared imagery from fixed-wing aircraft and satellites. The Center also helped in coordinating management of the project, procuring equipment and contracting support. Some of GeoMAC's data layers have also been provided by the Center. Anyone can visit this popular Web site at ***http://geomac.usgs.gov***. In addition, wildland fire managers may access a password-protected site through the same address. This special access gives the wildland fire manager a faster response time to the GeoMAC site, as there is less Internet traffic on the wildland fire manager's site.

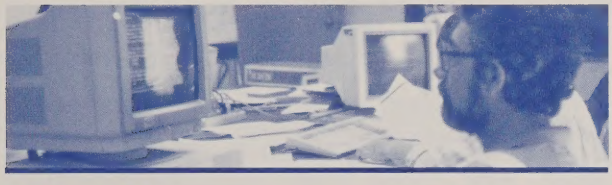
Client and office: Katy Madrid, National Interagency Fire Center
NSTC project participants: Wendy Bullock, Susan Goodman, Melinda Walker
Partners: Bureau of Indian Affairs, Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, National Oceanic and Atmospheric Administration

Cooperative Remote Sensing/GIS Project between Florida A&M University and the National Science and Technology Center

A collaborative project was developed in FY 2001 between Florida A&M University—a Historically Black College and University—and the Center to assist in developing teaching materials to provide

real-world Remote Sensing and GIS experience and to reinforce the working relations between the two institutions. Specific project work involves the use of digital orthophotoquads to extract off-highway vehicle routes on a project area within the Phoenix Field Office.

Client and office: Bill Gibson, Phoenix Field Office
NSTC project participants: Debra Dinville and Nancy Russell
Partner: Katherine Milla, Florida A&M University



Contractors

Architecture and Engineering Service Contracts

The Center has contracts in place for obtaining architecture and engineering (A/E) and other related services (planning, design, construction management) throughout the Bureau. Project work completed through these contracts in FY 2001 included condition assessments, feasibility studies, site analyses, resource management studies, master planning, interpretive planning and design, development concept plans, construction drawings, specifications, and construction inspections. In addition, the Center has developed partnerships through inter- and intra-agency agreements with several government agencies, including the U.S. Forest Service, the Bureau of Reclamation, and the National Park Service.

Remote Sensing and GIS Contracts

Remote Sensing and GIS contracting services were used in FY 2001 in support of the Great Basin Restoration Initiative to map changes in cheatgrass (*Bromus tectorum* L.) communities by analyzing Advanced Very High Resolution Radiometer satellite data. The primary objective of this task was to produce quantifiable data and an associated map showing decreases or increases in cheatgrass over time. Historical change detection mapping using aerial photography was applied to select demonstration sites in the Great Basin Restoration Area for changes in pinyon–juniper and cheatgrass over time. The primary objective of this project was to show change in vegetation over a specific area at a high resolution. Information was gathered on existing inventories for eight specific noxious weed categories that occur in the Great Basin Restoration Area. The objective of this project was to combine existing noxious weed data from disparate sources into one common theme.

Contracting services for remote sensing were used in an interagency statewide vegetation mapping project called the Colorado Basinwide Vegetation classification. The goal of this ongoing project is to produce a comprehensive vegetation classification scheme based on watershed delineation for the State of Colorado. Many State and Federal agencies in Colorado use the resulting vegetation mapping analysis.

Contracting support was also used for the development of automated spatial tools that connect with present Bureau national databases to optimize the use of these data. The Rangeland Information System (RIS) was developed and maintained to connect Grazing Authorization and Billing System and Rangeland Improvement Project System information with digital allotment boundaries. The Soils Suitability Extension (SSE) was developed as a set of standard queries from the Natural Resource Conservation Service State Soil and Soil Survey databases. The RIS and SSE extensions are examples of the type of support used in the Bureau's field offices. Other tools include an Ecological Site Inventory Extension, an Analysis Tools Extension, and the development of ArcIMS and ArcGIS weed applications for Montana.

Environmental Technical Assistance Contract

The Center has a contract in place for obtaining environmental services, including cost recovery services, site assessment for land transfer, environmental auditing of facilities, hazardous waste site evaluation and analysis, National Environmental Policy Act (1969) support, and restoration support. The contract was issued in partnership with the U.S. Forest Service. In addition, the Center has procured envi-

ronmental services through other mechanisms such as the General Services Administration's contracting schedule and memorandums of understanding with the Bureau of Reclamation and the Department of Energy.

Construction Management

The Center added Construction Management to its program in FY 2001. A Construction Manager staff position was created in June to provide administration and oversight during the construction phase of work. Inspection services will be provided through the Center by one of three national A/E contractors. The primary service provided by the program will be the day-to-day project oversight and related coordination efforts necessary to ensure strict adherence to construction contract documents.

Optimally, the Construction Manager will be designated as the Contracting Officer's Representative (COR), and will work closely with the onsite A/E inspector. Inspectors are trained professionals who possess specific knowledge of relevant building codes, regulations, and industry standards. Regular communication between the inspector and the COR is critical. Typical issues that arise are scheduling, payments, and overall quality control. Additionally, followup guidance from the design staff (either Bureau or A/E contractor) is used by the inspector (through the COR) for clarifications and modifications—part of the dynamics of all construction projects. An additional benefit of the program is accurate onsite documentation, which can prove invaluable in the event of a construction claim or other legal action. Ultimately, the goal is to close the loop between design and construction, thereby ensuring that the contractor builds the quality product expected by the agency client.

These services are available for all Bureau construction projects, whether designed by in-house staff or by private A/E contractors. State Offices are encouraged to use this service as a means of easing their workload and improving the quality of their end product. Projects presently under way are the Caliente Field Office Administration Building, designed by in-house Center staff; the Escalante Cannonville Visitor Center, the Vernal Readiness Center and Fire Cache, and the Cedar City ATB Operations Building, designed by A/E contractors.

Increase in Production of Bureau Automated 100K Maps

To meet critical Bureau mission requirements in fire management, wildland urban interface issues, and land use planning activities, production levels of the automated 100K maps are being increased. The Center has used outside sources of labor—both onsite contractors and small commercial firms—to meet these increased production requirements in a timely way.

National Science and Technology Center Staff Detailed Externally

Lee Barkow Detail to the Colorado State Office

Lee Barkow, Center Director, was provided an opportunity to serve as the Colorado Associate State Director for 7 weeks this year. Barkow was able to learn how one State was approaching implementation of the National Fire Plan and the challenges presented to field offices. He also observed how Colorado was approaching the management of new National Landscape Conservation System units with minimal staff and funding. As a result, Barkow brought U.S. Geological Survey and Bureau managers together for a week-long tour of three units to discuss science opportunities that the USGS could assist with and Bureau managers could benefit from. Finally, Barkow was given the opportunity to experience how myriad administrative matters were addressed at the State Office level. Collectively, this detail allowed the National Science and Technology Center Director to bring a current field perspective to Center management.

Debra Dinville
Detail to the DOI National Business Center and the Bureau's Colorado State Office

Debra Dinville's first detail was at the DOI National Business Center (NBC) in January, where she worked as the project manager for the demonstration Web site, YourLand.gov, leading the staff at the NBC toward project completion. She acquired the necessary funding and brought the project in on time and under budget. Her second detail was at the Bureau's Colorado State Office, where Dinville served as the acting Chief Information Officer/IRM Chief. This detail involved managing a diverse staff and included organizational budget preparation and justification, management of the Information Access Center, record management, handling Freedom of Information Act issues and requests, Web development, and geographic information systems responsibilities.

Dianne Osborne
Detail to the U.S. Geological Survey

As part of Dianne Osborne's 60-day developmental assignment, she worked in the USGS Office of Biological Informatics and Outreach in Reston, Virginia, where she assisted in the development of program materials to support the National Biological Information Infrastructure and the Gap Analysis Program. Another developmental assignment was for a DOI–USAID/CARE-sponsored program called the International Technical Assistance Program. This assignment was to provide Ecuadorian resource agencies, primarily Jatun Sacha and Ecociencia Geographic Information System (GIS) and Forestry staffs, with Remote Sensing and GIS technical training and assistance.

Bruce Van Haveren
Detail to the U.S. Geological Survey

Bruce Van Haveren served as Acting Director of the Northern Prairie Wildlife Research Center (NPWRC), Jamestown, North Dakota, in June and July 2001. A 62-person USGS research center with satellite field stations in Arkansas, Missouri, and Minnesota, the NPWRC is responsible for biological research throughout the Great Plains. Under this detail, Van Haveren organized and hosted an NPWRC-wide research planning meeting to identify and develop future research directions for NPWRC; challenged NPWRC staff to contribute ideas to the USGS Lewis & Clark Bicentennial Science Plan; outlined principles for a wetlands research strategy and challenged NPWRC scientists to expand wetlands research and to fill gaps in existing knowledge about prairie wetlands; met with Bureau and U.S. Forest Service field office managers to discuss science needs in the northern Great Plains; developed new client contacts in the U.S. Fish and Wildlife Service, National Park Service, and the Bureau of Land Management; reviewed NPWRC's research portfolio and made recommendations for program changes, including the addition of a Northern Great Plains riparian research initiative; contacted the president of North Dakota State University for future collaboration on natural resources and natural science research; and identified structural needs and initiated a plan for renovation of the main NPWRC building.

Personnel Detailed at the National Science and Technology Center

Marvin Keller
Acting Chief, Science Investigations Branch

Marvin Keller came to the Center from Billings, Montana, where he serves as Regional Archaeologist with the Bureau of Indian Affairs. During the 6 weeks of his detail he was able to gain valuable experience managing the Branch, where, he related, he "worked on developing my skills and recognizing my limitations." His contributions including providing an opportunity for Branch staff to discuss goals and general directions for the newly formed Branch.

Jaci Gould
Acting Chief, Science Investigations Branch

Jaci Gould works for the Bureau of Reclamation's New Mexico Area Office (Albuquerque), where she manages the Water Resource Management Division. Gould spent 6 weeks at the Center learning about the people, opportunities, and challenges of the Division of Science and associated branches. Gould continued the work Keller started, assisting Branch staff in understanding their roles in the organization. Gould provided opportunities for staff to discuss their concerns and expectations in preparation for the incoming branch chief. Gould also assisted the division chief in developing a process for the division and associated branches to define their roles in the organization.

Jennifer Gaines
Acting Chief, Resource Systems and Remote Sensing/GIS Applications Branch

Jennifer Gaines works for the USGS Center for Biological Informatics in Denver, Colorado. She spent 60 days between February and April 2001 acting as Chief of the Resource Systems and Remote Sensing/GIS Applications Branch at the Center. Gaines employed many of the skills she acquired during the DOI Team Leadership Program, such as leading change, leading people, business skills, and building coalitions and communication. Center staff were eager to offer assistance with questions or management issues. Gaines related that she learned about the Center's diverse skills and gained experience with Bureau issues. She assisted staff in accomplishing their goals by communicating change and promoting their involvement in various projects.

Lori Postlethwait
Acting Chief, Resource Systems and Remote Sensing/GIS Applications Branch

Lori Postlethwait came to the Center from the River and Reservoir Operations Branch of the Pacific Northwest Region of the Bureau of Reclamation, where she is a hydraulic engineer for reservoir operations. She said that she spent 4 weeks "learning about the diverse skills of the Branch and a little about some of my strengths and weaknesses in managing people." She related that she valued her time working with this group of highly professional, self-motivated individuals.

Other Personnel Working at the National Science and Technology Center

Carol Giffen
Liaison, U.S. Geological Survey

Carol Giffin serves as a U.S. Geological Survey (USGS) representative to the Bureau of Land Management's National Science and Technology Center, interacting with Washington, State, and field office representatives to address joint mapping issues, the exchange of technical information, and partnership development. The cooperative efforts of the Bureau and the USGS resulted in new geographic data portraying the land's elevation and features, temporary personnel exchanges, and the development of the National Spatial Data Infrastructure. The Center is addressing an extensive range of science issues, and Giffin recently completed assignments to the geology, water, and biology offices of USGS to provide broader representation for the USGS and to increase the Center's understanding of USGS scientific activities.

Eric Hecox
Intern from Indiana University

Eric Hecox attends graduate school at Indiana University, where he is presently pursuing a joint degree through the School of Public and Environmental Affairs. His summer internship with

the National Science and Technology Center involved two projects: His primary responsibility was to conduct research on Western States' water laws. In addition to water rights research, he assisted the project team in the administration of the Resource Notes series, a component of the Center's science strategy.

Charli Strebig
Intern from Colorado School of Mines

Charli Strebig attends the Colorado School of Mines, where she is pursuing a degree in chemistry. During her term as a temporary employee of the Center, Strebig has been assisting staff with the evaluation and cleanup of abandoned mine land sites and hazardous waste sites. This work included the collection of environmental samples, data analysis and management, and report review and writing. In the summer of FY 2001, Strebig also completed her training in first aid, CPR, and OSHA hazardous waste operations.

Darrick Smith
Intern from Langston University

Darrick Smith is a student at Langston University. Smith worked on a geographic information systems water project through the Richfield Field Office, Utah, helping Richfield's hydrologist. Smith created ArcView layouts of water chemistry data to help the hydrologist locate wells and springs that may have potential water quality and chemistry problems. He also helped design several GIS Web pages while at the Center. He learned how to collect data using Global Positioning System technology and incorporated these data into a GIS. He also attended a Regional ESRI Users Conference

Jennifer Knudson
Intern from the University of Colorado–Boulder

Jennifer Knudson, a history major at the University of Colorado–Boulder, is working as an intern on the Washington Office project to digitize current and historical photos of Bureau lands and people. Insights gained during the photo digitization project led to Bureau participation in the Colorado Digitization Project (CDP). The CDP is a collaborative effort to digitize photographs, maps, diaries, and other important documentation to create an open, distributed, publicly accessible digital library for Colorado residents. This project is funded by the Institute of Museum and Library Services (an independent Federal agency), the State Library, the State Historical Fund, and the Regional Library Service Systems.

Volunteers

Short-term volunteers included Michael Milner and Jennifer Owens. In August, Milner worked in the Bureau Library in an effort to earn a Boy Scout merit badge, updating the Environmental Education and Volunteers collection. Owens, a first-year art major at the University of Colorado–Boulder, assisted Washington Office staff member Steve Shafran with a PowerPoint presentation directed at student recruits.

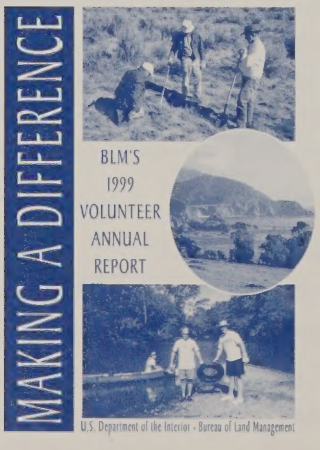
Reaching Out to Others

The Bureau of Land Management is dedicated to serving its customers. High-quality customer service is one of the Bureau's highest priorities as it strives to match or exceed the best service available in the private sector.

Professional Commitment to Outreach

The Bureau's 1999 Volunteer Annual Report

More than 17,000 volunteers contribute to the care of public lands by supporting the work of the Bureau of Land Management each year, from conducting field work in remote locations to providing administrative support in some of the Bureau's busiest offices. *Making a Difference—BLM's 1999 Volunteer Annual Report* describes volunteer activities in support of specific Bureau programs and provides data on the number of volunteers, hours contributed, and estimated values and costs. The report, with editing, design, and layout services provided by the Center, was distributed to Bureau volunteer coordinators and other interested parties. It is also available at ***www.blm.gov/volunteer/news/annreport/index.html.***



National Public Lands Day Activities

Each year for the past several years, the Bureau has been a partner, along with the National Environmental Education and Training Foundation, other Federal agencies, and several nongovernment organizations, in sponsoring National Public Lands Day. This event brings volunteers together to help

improve and restore America's public lands and resources. It also provides an opportunity for the Bureau and its partners to educate volunteers about the environment. To be successful, the event must be well publicized and the efforts of volunteers must be recognized. Center publication professionals worked directly with a representative of the National Environmental Education and Training Foundation to develop and produce posters, brochures, and certificates for volunteers. Products were provided to partner agencies for further distribution within their communities to inform the public about the event, solicit help from volunteers, and thank volunteers for their hard work.

Denver Federal Executive Board 2001 Diversity Training Seminar

The Denver Federal Executive Board's 2001 Diversity Training Seminar, *Inclusion Through Education*, was supported by Center publications staff, who produced the seminar program and posters, signage, and a biography booklet about the presenter. The Workforce Diversity Council, which presented the seminar, is composed of members of the Equal Employment Opportunity Committee, the Federal Women's Program, the American Indian Program, the Black Employment Program, and the Hispanic Employment Program. These committees are made up of Federal employees who have volunteered their time and efforts to help educate and expand the horizons of the Federal system and workforce.

Present and Future Constituents

Sweetwater County Fair Display

County fairs provide an excellent forum for the Bureau to reach out to local constituents. When staff of the Rock Springs (Wyoming) Field Office requested production assistance for a Bureau exhibit to be presented at the Sweetwater County Fair, Center staff provided timely, targeted services. The display, *Keeping Water on the Land Longer,* describes how to keep land healthy and productive, how the introduction of houses and roads affect the nature of the land, and why soil compaction makes it difficult for vegetation to grow.

MESA Conference

The Mathematics, Engineering, Science Achievement (MESA) conference provides recruitment opportunities for minority students in math and engineering fields in private industry and government agencies. Along with the National Business Center, the National Science and Technology Center participated as a prime sponsor, with six representatives meeting with students and attending the MESA luncheon. A 72-inch Bureau banner was produced for the conference, as well as a Bureau recruitment advertisement in the yearly MESA publication.

National Boy Scout Jamboree Exhibit

Walk on the Wild Side, the Bureau's 2001 National Boy Scout Jamboree exhibit, was a great opportunity to reach out to an important audience—the more than 33,000 Boy Scouts and their leaders who attend this yearly outdoor gathering. The Bureau's Environmental Education staff took the opportunity to educate Jamboree participants about Bureau programs such as paleontology, cultural heritage, inva-

sive plants, and recreation in a fun maze of information (53 vinyl panels of various sizes). Center staff worked with the Washington Office to produce the exhibit, providing design and production services. Durable outdoor materials were needed to hold up under varying weather conditions. By using in-house

services, the Bureau saved tens of thousands of dollars.

Denver Area Council of the Boy Scouts of America

The Center provides support on land and resource management issues on properties belonging to the Denver Area Council of the Boy Scouts of America. A staff forester worked with the council in locating three new roads at the 2,600-acre Peaceful Valley Scout Ranch in Elbert County, Colorado. These roads provide access to expanded camping areas and new facilities.

Peaceful Valley Scout Ranch is a working ranch with hay fields and livestock grazing, as well as summer camping facilities. Following the advice of a staff range specialist contained in a Center-authored grazing plan, the summer pasture was split to implement a rotation grazing system that would improve forage production and vegetative cover. At the request of the council, a staff fishery biologist is preparing recommendations on fishery management of a lake at Camp Tahosa in Boulder County, Colorado, to improve the quality of fishing and fishery habitat

Lou's Soap Box

Center staff member Louise Ecoff coordinates the collection of toiletry items (miniature bars of soap, shampoo, lotion, and other items) from hotels where staff stay in the course of their official travel. These items are then donated to the "Gathering Place"—a Denver-area shelter for battered women—where the items are greatly needed and appreciated.

Take Our Children to Work Day

Take Our Children to Work Day is a unique opportunity to provide staff members' children with educational opportunities, mentoring, and just plain fun. For this year's celebration in April, the Center co-sponsored one of the three workshops put on by the Bureau's National Centers. The children interviewed science staff (recreation planner, wildlife biologist, and wild horse and burro specialist) to learn about the Bureau and report on some resource issues and programs. They learned how to write and create a document from scratch with help in Internet and traditional research from library staff, writing and editing tips from a staff editor, and layout and design guidance from visual information specialists. The resulting document, *BLM: Kids Taking Over Parents' Jobs*, was posted on the Center Web site and also at ***www.blm.gov/kids***.

The Center also assisted the National Information Resources Management Center with a workshop that recognized the thirtieth anniversary of the Wild Horse and Burro Program. Children in this second workshop participated in a variety of activities, learning about the Adopt-A-Horse program, the connections between wild horses and burros and livestock, wildlife uses of the public lands, and the historical roles of wild horses and burros. The children also had an opportunity to work with a graphic artist in the creation of a booklet on the day's activities. They used a desktop scanner to manipulate photographs and their original drawings to digitally include them in the booklet, and they learned about page layout and editing in producing this booklet. The workshop's activities were also captured on the Web site at ***www.blm.gov/kids***.

Adjunct Faculty Affiliations

Sisseton–Wahpeton Community College

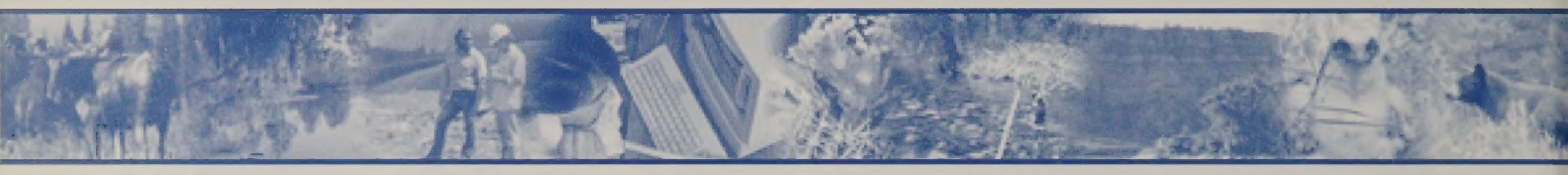
Bruce Van Haveren, a Science and Research Advisor with the National Science and Technology Center, taught a 1-week, two-credit short course on landscape analysis at Sisseton–Wahpeton Community College, Sisseton, South Dakota. This was the last year of a 3-year project to assist tribal colleges in capacity-building in the areas of natural resources and environmental science. This project focused on providing assistance in curriculum development and teaching to tribal colleges in North Dakota, South Dakota, Montana, and Nebraska.

Florida A&M University

Jerry Fiedler, a geodesist with the Center, accepted a temporary reassignment in August to teach three surveying courses at Florida A&M University. The

Division of Engineering Technology at the university offers a Civil Engineering Technology Survey Option program that consists of 33 surveying hours. Upon completion of this course work, students are eligible to take the Surveyor in Training examination in Florida. Presently, Florida A&M University does not have a survey program leading to an undergraduate degree in surveying. Fiedler taught three courses (Fundamental Surveying, Photogrammetry, and Modern Surveying Instrumentation) for a total of nine semester hours. In addition, he provided technical assistance to three students involved in a mapping project of Florida A&M University's research farm.

Professional Activities and Recognition



The staff of the National Science and Technology Center is committed to fulfilling the mission of the Bureau—to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations. To this end, staff members actively support the Bureau's mission through a multitude of professional activities, from participation in conferences, meetings, and training to researching and preparing publications for use by Bureau personnel and Bureau partners.

Publications

Breithaupt, B. H., and N. A. Matthews. 2001. Preserving paleontological resources using photogrammetry and geographic information systems. Page 47 *in* Crossing boundaries in park management: The eleventh conference on research and resource management in parks and on public lands. The George Wright Society Biennial Conference, Denver, Colorado. [Abstract]

Breithaupt, B. H., and N. A Matthews. 2002. Preserving paleontological resources using photogrammetry and geographic information systems. *In* Crossing boundaries in park management: Proceedings of the eleventh conference on research and resource management in parks and on public lands. The George Wright Society Biennial Conference, Denver, Colorado. In press.

Breithaupt, B. H., E. H. Southwell, T. L. Adams, and N. A. Matthews. 2001. Innovative documentation methodologies in the study of most extensive dinosaur tracksite in Wyoming. *In* A fossil odyssey: Partners for a new millennium. Sixth conference on Fossil Resources, Grand Junction, Colorado [Abstract]

Breithaupt, B. H., E. H. Southwell, T. L. Adams, and N. A. Matthews. 2002. Innovative documentation methodologies in the study of most extensive dinosaur tracksite in Wyoming. *In* A fossil odyssey: Partners for a new millennium. Proceedings of the sixth conference on fossil resources, Grand Junction, Colorado. In press.

Bureau of Land Management Science Strategy. 2001. Bureau of Land Management. 19 pp.

Bureau of Land Management. 2001. CERCLA Response Actions Handbook. Bureau of Land Management, Handbook 1703-1.

Clemmer, P. 2001. Riparian Area Management: The use of aerial photography to manage riparian–wetland areas. Revised edition. Bureau of Land Management. n.p.

Goodman, S. 2001. Geospatial task group brochure. Bureau of Land Management. [brochure]

Matthews, N. A., and B. H. Breithaupt. 2001. Close-range photogrammetric experiments at Dinosaur Ridge. Mountain Geologist 38:147–153.

Matthews, N. A., B. H. Breithaupt, T. Lumme, and N. C. Fraser. 2001. Paleontologic resource documentation using an aerial camera blimp at Jurassic fossil sites in Wyoming. In A fossil odyssey: Partners for a new millennium. Proceedings of the sixth conference on fossil resources, Grand Junction, Colorado. [Abstract]

Matthews, N. A., B. H. Breithaupt, R. E. Moore, and C. Neff. 2001. Laser technology meets dinosaur paleontology. In A fossil odyssey: Partners for a new millennium. Sixth conference on fossil resources, Grand Junction, Colorado. [Abstract]

Matthews, N. A., B. H. Breithaupt, and E. H. Southwell. 2000. Photogrammetric documentation of a Middle Jurassic dinosaur tracksite in the Sundance Formation of the Bighorn Basin of Wyoming. Journal of Vertebrate Paleontology 20(3). n.p.

Presentations

Breithaupt, B. H., and N. A Matthews. 2001. Preserving paleontological resources using photogrammetry and geographic information systems. Crossing boundaries in park management: The eleventh conference on research and resource management in parks and on public lands. The George Wright Society Biennial Conference, Denver, Colorado.

Breithaupt, B. H., E. H. Southwell, T. L. Adams, and N. A. Matthews. 2001. Innovative documentation methodologies in the study of most extensive dinosaur tracksite in Wyoming. A fossil odyssey: Partners for a new millennium. The sixth conference on fossil resources, Grand Junction, Colorado.

Clemmer, P. 2001. Instructor, Geodata collection and use. February, Reno, Nevada.

Clemmer, P. 2001. Instructor, Remote sensing and map reading. March and April, Field skills module of the Lands and Realty Academy.

Clemmer, P. 2001. Instructor, Using aerial photography to determine proper functioning condition. May, Reno, Nevada.

Clemmer, P. 2001. Instructor, Aerial photo interpretation workshop. GIS/Remote Sensing workshop, June, Cheyenne, Wyoming.

D'Erchia, T. 2001. Panel chair, Editing for the new millennium. Hats off to communicators, National Association of Government Communicators workshop, March 7–9, Denver, Colorado.

Doran, P. 2001. Designing for the Web. Hats off to communicators, National Association of Government Communicators workshop, March 7-9, Denver, Colorado.

Ford, K. 2001. Mine waste repositories, selection, design, and cost. Department of the Interior Environment Conference, March, Albuquerque, New Mexico.

Goodman, S. 2001. ESRI user conference, July 10–12, San Diego, California.

Jackson, W. L, and C. Smith. 2001. Update on mapping standards. Bureau of Land Management GIS conference, April 23–27, Phoenix, Arizona.

Marchase, M. 2001. Using aerial photography to help assess and restore environmentally damaged areas. U.S. Department of the Interior 2001 conference on the environment: The path before us—Environmental stewardship for the twenty-first century, March, Albuquerque, New Mexico. [poster presentation]

Marchase, M. 2001. Using aerial photography to help assess and restore environmentally damaged areas. Bureau of Land Management GIS conference, April 23–27, Phoenix, Arizona. [poster presentation]

Matthews, N. A. 2001. Put power in your presentations. Federally employed women: Finding energy for women. Rocky Mountain Chapter training program, March, Lakewood, Colorado.

Matthews, N. A. 2001. From dinosaur tracks to management tracking: GIS. Federally employed women: Finding energy for women. Rocky Mountain Chapter training program, March, Lakewood, Colorado.

Matthews, N. A., B. H. Breithaupt, T. Lumme, and N. C. Fraser. 2001. Paleontologic resource documentation using an aerial camera blimp at Jurassic fossil sites in Wyoming. A fossil odyssey: Partners for a new millennium. The sixth conference on fossil resources, September 10–14, Grand Junction, Colorado. [poster presentation]

Matthews, N. A., B. H. Breithaupt, R. E. Moore, and C. Neff. 2001. Laser technology meets dinosaur paleontology. A fossil odyssey: Partners for a new millennium. The sixth conference on fossil resources, September 10–14, Grand Junction, Colorado.

Matthews, N. A., B. H. Breithaupt, and E. H. Southwell. 2000. Photogrammetric documentation of a Middle Jurassic dinosaur tracksite in the Sundance Formation of the Bighorn Basin of Wyoming. Sixtieth annual meeting of the Society of Vertebrate Paleontology, October 25–28, Mexico City, Mexico.

Meyer, P. 2001. Restoration Program workshop, February, Bureau National Training Center, Phoenix, Arizona.

Meyer, P. 2001. Natural resource damage assessment and restoration. Department of the Interior Environment Conference, March, Albuquerque, New Mexico.

Morris, T. 2001. The use and integration of GPS, GIS photography in the inventory and evaluation of hazardous waste sites. Alaska Forum for the Environment and Department of the Interior Environment Conference, March, Albuquerque, New Mexico.

Russell, N. 2001. Mapping OHV routes from DOQs. Bureau of Land Management GIS conference, April 23–27, Phoenix, Arizona.

Schafersman, D. 2001. BLM CERCLA response actions handbook. Department of the Interior Environment Conference, March, Albuquerque, New Mexico.

Smith, C. 2001. Status of BLM automated 100K production. Bureau of Land Management GIS conference, April 23–27, Phoenix, Arizona. [poster presentation]

Stulz, M. 2001. ESRI International User Conference July 10-12, San Diego, California..

Stulz, M. 2001. The Rangeland Information System: A customized ArcView Geographic Information System (GIS) application for the Bureau of Land Management. The Society for Rangeland Management fifty-fourth annual meeting, February 17–23.

Stulz, M. 2001. Bureau of Land Management GIS Workshop, April 23–27, Phoenix, Arizona.

Walker, M. 2001. GeoMAC presentations:
Western Governors Association (WGA) representatives, May 15, U.S. Geological Survey (USGS), Lakewood, Colorado.
WGA Executive Committee, June 25, WGA Office, Denver, Colorado.
GIS Seminar, April 27, Colorado State University, Fort Collins, Colorado.
GIS 2001 Conference, April 25, USGS, Lakewood, Colorado.
Infrared Interpreters Annual Meeting, February 20–22, Phoenix, Arizona.
Society of American Forester's Annual Convention, September 16, Denver, Colorado.

Walker, M. 2001. Instructor, Remote sensing and GIS: USGS GIS 2001 Conference, April 23, National Science and Technology Center, Lakewood, Colorado.
GeoData collection and use, February 5–8, Reno, Nevada.
Abandoned mine land characterization, July 9–13, National Science and Technology Center, Lakewood, Colorado.

Staff Contributions to the National Training Cadre

1400-08, Pathways. National Science and Technology Center (Center) instructors: Lee Barkow, Paul Meyer, and David Schafersman.

1400-12, Leadership Challenge. Center instructor: David Schafersman.

1703-19, CERCLA Cost Recovery–Cost Avoidance. Center instructors: Paul Meyer and Janet Youngdahl.

1703-14, Characterization of Abandoned Mine Lands. Center instructor: Karl Ford.

7000-11, Stream Dynamics and Channel Design for Reclamation (National Training Center [NTC] Course).

1737-12, Aerial Photography Training to Assess Proper Functioning Condition (NTC Course).

Water Erosion Prediction Project Workshop, Salem, Oregon.

Awards

Peter Doran, Center Graphics Editor, received the Blue Pencil Award from the National Association of Government Communicators for the USGS publication *Status and Trends of the Nation's Biological Resources*. As a staff Visual Information Specialist, Doran worked in collaboration with the U.S. Geological Survey to create this landmark document. It is the second major publication of the U.S. Geological Survey's (BRD) inventory and monitoring program, and the first in a series of scientific publications that will compile and present status and trend formation for use by resource managers and the public. The award was presented at the National Association of Government Communicators workshop, Hats Off to Communicators, which was held March 7–9, 2001, in Denver, Colorado.

Don Prichard, Center Fishery Biologist, was selected on September 20 as recipient of the Department of the Interior's distinguished Environmental Achievement Award for 2001. The Department recognizes employees for exceptional achievements or contributions in a broad range of environmental discipline areas. Prichard was selected because of his outstanding personal efforts and leadership over the past 10 years in the implementation of a national riparian–wetland assessment process as part of the Bureau's strategy to restore and maintain these resources. The development of these protocols, related guidance, and training involved numerous stakeholders from the U.S. Forest Service, the Natural Resource Conservation Service, State agencies, private entities and international contacts.

Looking Toward the Future

Science and technology are becoming mainstays to the way the Bureau of Land Management does business. Never before has there been a more favorable environment for facilitating science and technology as a part of the land management process. Current technologies are becoming affordable and new technologies are continually providing opportunities. The National Science and Technology Center's challenge is to apply these current and new technologies to the problems that resource managers and specialists face. Technology can often be used for applications other than those for which it was originally developed. Center staff must understand and use the technology well enough to recognize opportunities for innovative applications.

Information and knowledge are continuing to explode at an almost exponential rate. The mission of the Center is to bring relevant science to managers and specialists in a form that can readily be used to solve management issues. This "packaging" of science is of the utmost importance and the reason for establishing the new Branch of Science Investigations. The Center must work effectively with all its science providers, including those at the U.S. Geological Survey and the Cooperative Ecosystem Studies Units throughout the United States. It is critical that the Center implement the Bureau's Science Strategy through development of the regional science catalogs and then share its science needs with those who can help address them.

The Center continues to move toward being a significant source of scientific information and technical assistance to its field customers and toward seeking solutions to regional and national management problems. The focus of Center staff is to solve those management problems that have the broadest scope, while understanding that a need at the local level is often just as critical to achieving positive natural resource results. The Center's success will continue to be judged by its customers and by those who provide the financial resources for it to carry out its mission. Center staff value customer feedback and welcome present and potential customers to work with them to set an agenda for the future and to keep the Center on a productive track.

The National Science and Technology Center is an important part of the solution, but no means the only part. The Center's motto continues to be "Helping those who manage the land."

Acronyms

A/E – Architecture and Engineering

AML – Abandoned Mine Lands

ATB – air tanker base

ATE – Analysis Tools Extension

BLM – Bureau of Land Management

BOR – Bureau of Reclamation

CBM – coalbed methane

CDP – Colorado Digitization Project

CMR – Corporate Metadata Repository

COR – Contracting Officer's Representative

EIS – Environmental Impact Statement

ESIE – Ecological Site Inventory Extension

ESRI – Environmental Systems Research Institute

FLPMA – Federal Land Policy and Management Act

FORVIS – Forest Vegetation Inventory System

GABS – Grazing Authorization and Billing System

GBRI – Great Basin Restoration Initiative

GIS – Geographic Information Systems

GPS – Global Positioning System

IB – Information Bulletin

IDS – Inventory Data System

LTVA – long-term visitor area

MESA – Mathematics, Engineering, Science Achievement

NBC – National Business Center

NCA – National Conservation Area

NIFC – National Interagency Fire Center

NOAA – National Oceanic and Atmospheric Administration

NPWRC – Northern Prairie Wildlife Research Center

NRCS – Natural Resource Conservation Service

NRST – National Riparian Service Team

NSTC – National Science and Technology Center

OHV – off-highway vehicle

PRP – potentially responsible party

RAS – Rangeland Administration System

RIPS – Rangeland Improvement Project System

RIS – Rangeland Information System

RMP – Resource Management Plan

SCC – Science Coordinating Committee

SSE – Soils Suitability Extension

SWA – Site Writeup Area

TR – Technical Reference

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Survey

VRM – Visual Resource Management

WEPP – Water Erosion Prediction Project

Appendix A. Projects Completed in Fiscal Year 2001

Project Name	Client
Alaska	
Alaska AML and Hazmat Site Investigation and Mapping	Susan Flora
Alaska Forum on the Environment Presentation – GPS/GIS Site Mapping	Susan Flora
Alaska NFO Site Investigations Mapping Support	Susan Flora
Alaska Northern Field Office Support for Mapping Hazardous Waste Sites	Susan Flora
Gold Bench/Ironside Bar AML Site Characterization	Linda Butts
Rapid Response Mapping Support on the National Petroleum Reserve – Alaska	John Payne
Red Devil Mine Risk Assessment	Mike Alcorn
Value Engineering for Coldfoot Interagency Visitor Center	Rodd Moretz
Arizona	
Arizona 100K Mapping (FY 1999–2000)	Jim Hutchison
Arizona 100K Mapping (FY 2000–2001)	Angel Mayes
Burro Corrals Well Site Investigation	Duane Ferneau
Cadastral Automation Support	Dennis McKay
Combating Desertification	Beth Perault
Empire Cienga Road	Bruce Beierle
Florence, Arizona (Phase 1) – Route Inventory/OHV	Bill Gibson
Florence, Arizona (Phase 2) – Route Inventory/OHV	Bill Gibson
Grand Canyon–Parashant National Monument – Scoping Report and Pilot Project/OHV Mapping	Cimarron Chacon
Haekel Road Scoping Report	Bruce Beierle
La Posa Water System	Scott Debock
Lake Havasu Recreation Sites (Phase 3) – Deferred Maintenance	Bill Parry
Nixon Fire Station	Dan Stone
Planning for Mega-meeting	Gregg Simmons
Virgin River Instream Flow Hydrologic Model	Ron Hooper
Vekol Valley Road Improvement (Phase 1) – Deferred Maintenance	Sedrick Green

California

Bridge Inspections and Evaluations ..... Merlin McDaniel
Corn Springs Well Revisited ..... Ronald Noordman
Eagle Lake RA (Susanville) Resource Natual Color Aerial Photography ..... Donald Wannebo
Hydrologic and Geochemical Review of Mesquite Mine Expansion ..... Kevin Marty
Molycorp Waste Materials Mapping Project with AVIRIS ..... Molly Brady
South Lassen Street Trail Bridge ..... Donald Wannebo
Weed Brochures ..... Mary Lou West

Colorado

Arkansas River Water Needs Assessment ..... Dave Taliaferro
Colorado 100K Mapping (FY 2000–2001) ..... Keven Huffstutler
Colorado Interagency Vegetation Classification ..... John Carochi
Colorado Recreation Map ..... Tina McDonald
Evaluation of Photogrammetic Support Needed by Royal Gorge Field Office ..... Dan Grenard
GIS Map of Henson Creek Watershed Study Area ..... Barbara Hite
Kremmling – OHV Routes ..... John Arkins
OHV – Photo Interpretation Class Development (Pilot) ..... Doug Diekman
OHV Strategy for Public Scoping Meetings ..... Dennis Zachman
OHV Support Workshop ..... Doug Diekman
Photogrammetric Support for Garden Park Fossil Area ..... Dan Grenard
San Miguel River Study ..... Dennis Murphy
South Park Groundwater Sampling, Phase II ..... Roy Smith
Uncompahgre Plateau Project Logo and Letterhead ..... Maggie McCaffrey
Vegetation Classification Enhancement ..... Jim Ferguson

Eastern States

Eastern States Vantage Annual Report ..... Peggy Riek
Eastern States Vantage Newsletter Special Edition ..... Corky Rodine
Meadowood Farm ..... Charles Bush

Idaho

Conceptual Site Plan for Dike Recreation Area ..... Gary Stevens
Idaho 100K Mapping (FY 2000–2001) ..... Chris Garvin
Interpreting Indicators of Rangeland Health ..... Mike Pellant
Kaiser Spring Hydrogelogic Assessment ..... William Cook
Malad Fire Station Design ..... Gary Stevens
OHV Route Inventory Statement of Work (Lower Snake River District) ..... Dirk Shupe
Pocatello Air Tanker Base ..... Gary Stevens
Rogerson Fire Station ..... Gary Stevens
Salmon River Riparian Aerial Photography ..... Howard Merriman
Site Development Study for the Mackay Reservoir Site Rehabilitation ..... Gary Stevens
Ten Mile Terrace Geophysical Survey for Sand and Gravel Assessment ..... Bob Mallis

Montana

Billings/Bridger Recreation Map ..... Corla Debar
Lewistown HVAC Modifications – Consultation and Submittal Review ..... Greg Bergum
Montana 100K Mapping (FY 2000–2001) ..... Corla Debar
Montana A/E Selection ..... Greg Bergum
Weeds ARCIMS ..... Kathie Jewell

Nevada

Assistance with Veta Grande AML Site Engineering Evaluation/Cost Analysis ..... Neal Brecheisen
Battle Mountain Master Plan ..... Jon Ekstrand
Caliente Field Station – Administrative Office Building ..... Mike Fewell
California Trail Center ..... Jon Ekstrand
Carlin Fire Station ..... Norman Rockwell
Caselton Tailings Removal Site Evaluation and Engineering Analysis/Cost Evaluation .. Dan Netcher
Elko CIR Riparian Aerial Photography ..... Carol Marchio
Nevada 100K Mapping (FY 2000–2001) ..... Mark O'Brien
Norse Windfall Engineering Evaluation/Cost Analysis ..... Terry Neumann
Red Rock Canyon Visitor Center Inspections ..... Kim Schuett
Red Rock Signage Plan – Phase I ..... Greg Gnesios
Red Rock Visitor Center Remodel ..... Kim Schuett
Tablefire Flooding ..... Gary Medlyn
Technical Climate and Air Quality Preparation for 3809 Mining Regulations EIS ..... Paul McNutt
Trout Creek Bridge Replacement ..... Norman Rockwell
Tybo Tailings Surface Water Controls and Cover Design ..... Terry Neumann
Wild Horse and Burro Handbook ..... Lili Thomas

New Mexico

El Malpais Recreation Map ..... Greg Homan
Helium Operations Electrical Inspection ..... Katie Gallardo
Helium Resources of the US – 2001, Tech Note 408 ..... Brent Gage
New Mexico 100K Mapping (FY 2000–2001) ..... Bob Bewley
Rio Benito Water Rights ..... Jim Schroeder
Technical Climate and Air Quality Preparation for the Camino Real EA ..... Charles Carroll

Oregon

Accelerating Cooperative Riparian Restoration and Management ..... Wayne Elmore
Cleveland Mill Tailings – Deer Camp Removal Site Evaluation ..... Jake Jakaboski
FORVIS Install – Oregon ..... Al Gardner
Implementing the BLM Science Strategy and Advancing Science in BLM ..... Bob Alverts

Oregon *(continued)*

Oregon 100K Mapping (FY 1999–2000) . . . . . Judy Briney
Oregon 100K Mapping (FY 2000–2001) . . . . . Judy Briney
Oregon Trail Center Repair . . . . . Vern Pritchard
Riparian Poster Session for SAF Conference, September 13–16 . . . . . Carol Connolly
Umpqua Mine (AML) . . . . . Eric Heenan
Update Process for Preparedness Level . . . . . Gerry Day
Western Oregon Watershed Modeling Project . . . . . Chester Novak

Utah

Ad Hoc Wildland Fire Technology Committee . . . . . Sheldon Wimmer
Calf Creek Site Map (GSENM) . . . . . Bryce Lloyd
Cedar City Air Tanker Base . . . . . Dave Bott
Convert USGS–Utah Water Source Chemistry Data to GIS Format . . . . . Phil Zieg
GSENM A/E Contract Selection, Design, and Review . . . . . Casey Matthews
Hydrogeologic Assessment of Impacts of Well Development on BLM Water Rights . . . . Randy Beckstrand
Manning Canyon AML PRP Investigation . . . . . Jack Brown
Photogrammetric Support for Cleveland-Lloyd Quarry (Price, Utah) . . . . . Mike Leschin
San Rafael Swell Resource Aerial Photography – West Half . . . . . Julie Casper
SW Utah Natural Color Resource Aerial Photography . . . . . Julie Casper
Upper Fremont River Narrows Restoration Scoping . . . . . Phil Zieg
Utah 100K Mapping (FY 2000–2001) . . . . . Gary Gale
Vernal Fire Office . . . . . Gary Hunter

Washington Office

100K Automated Mapping Development . . . . . Ed Harne
Abandoned Mine Lands Web Site Support . . . . . Rory Raschen
Access – FORVIS Link . . . . . Rick Tholen
A/E BLM Level 4 and 5 Road Condition Assessment . . . . . Bernie Hyde
A/E Routes Inventory . . . . . Linda Force
A/E Selection for ID/IQ Contractor . . . . . Bernie Hyde
AML Cleanup Program Cost Recovery Component . . . . . George Stone
AML Strategic Plan . . . . . George Stone
Annual Inventory Monitoring and Evaluation Report . . . . . Dick Mayberry
Annual Performance Plan (FY 2001) and Report (FY 1999) . . . . . Carl Zulick
Argonne National Laboratory MOU Coordination . . . . . Henri Bisson
Back to School . . . . . Mary Tisdale
Basic Training Course for Entry-level Hazardous Materials Coordinators . . . . . Nancy Dean
Billing System and the Rangeland Improvement Project System . . . . . Tim Hartzell
BLM Guide to CERCLA Response Actions . . . . . Nancy Dean
BLM NRDAR Case Screening and Initiation . . . . . Bernie Hyde

Washington Office *(continued)*

BLM Performance Plan ..... Janine Velasco
BLM Representative to Interagency Improve Steering Committee ..... Tim Reuwsaat
BLM Representative to Interagency NADP/NTN Executive Committee ..... Tim Reuwsaat
BLM Representative to Interagency WESTAR Council ..... Tim Reuwsaat
BLM-wide Professional Library Services ..... Tom Fry
Boy Scout Jamboree Exhibit ..... Mary Tisdale
Bridge Safety BLM Lead ..... Linda Force
Bureau Climate Liaison ..... Tim Reuwsaat
Bureau-wide Air Quality Liaison ..... Tim Reuwsaat
Civilian Conservation Corps Brochure ..... Mary Tisdale
CMR Exhibit and Brochure ..... Theresa Fresquez
Complete Software to Construct APDS and Transfer Data to GCDB ..... Bob Ader
Cultural Heritage Program Strategic Plan ..... Richard Brook
Demonstration of HRSS at the Central Hazmat Fund
Technical Review Committee Meeting ..... Nancy Dean
Development of Model Documents Addressed in CERCLA
Response Actions Handbook ..... Nancy Dean
Digital Format of RMP Boundaries ..... Ted Milesnick
Directory of BLM Hazmat Coordinators ..... Nancy Dean
Discovering Dinosaurs ..... Elizabeth Rieben
DOI Restoration Program Work Group ..... Bernie Hyde
Engineering Advisory Team ..... Bernie Hyde
Federal Interagency Sedimentation Project ..... Eric Janes
FIMMS Coordinator ..... Linda Force
Focus Area Priority Setting ..... Kit Muller
Forestry Forms Coordination ..... John Stewart
GABS and RIPS Rehost ..... Tim Hartzell
GIS Products for National Sage Grouse Steering Committee Meeting ..... Mark Hilliard
Guide Specifications for Construction Support ..... Linda Force
Hazmat and Environmental Contract Support ..... Nancy Dean
HBCU Support (FAMU-Cadastral) ..... Bill Nunn
HB User Representative ..... Bud Cribley
Indian Mineral Owners Quick Reference ..... Bob Anderson
Interagency Geographic Science Coordination ..... Ed Harne
Journal Article – Research Administration ..... John Haugh
Land Use Planning Support ..... Ann Aldrich
Making a Difference – BLM's 1999 Volunteer Annual Report ..... Mary Tisdale
Management of BLM Statellite Archive ..... Ed Harne
Management of Interagency Printing Activities ..... Ed Harne
Micrographic Support FY 2001 ..... Don Buhler
Monitoring and Inventory Program ..... Tom Roberts
National Assessment Prototype Project Support ..... Sherry Barnett

Washington Office *(continued)*

National BLM Public Lands Database . . . . . Ed Harne
National Interagency Technical Team on Ecological Units Mapping . . . . . Jim Stone
National Landscape Conservation System Exhibit . . . . . Jeff Krauss
National Public Lands Day . . . . . Mary Tisdale
National Public Lands Day Celebration Tattoo . . . . . Mary Tisdale
National Resource Inventory . . . . . Dick Mayberry
NCP Removal Document Examples for Hazmat Web Site . . . . . Nancy Dean
Nighthawk Removal Action . . . . . Jake Jakaboski
NRDAR Program Coordination in BLM . . . . . Bernie Hyde
Project Management Guidance for BLM OSC/RPM . . . . . Nancy Dean
Public Lands Opportunity Book . . . . . Patrick Gubbins
Public Rewards from Public Lands . . . . . Celia Boddington
Rangeland GIS with Extensions . . . . . Tim Reuwsaat
Range Permit Renewal TPRS . . . . . Tim Hartzell
ReGAP Cooperative Vegetation Mapping . . . . . Tim Hartzell
Sagebrush Habitat Committee Participation . . . . . Chris Jauhola
SCEP Exhibit . . . . . Steve Shafran
Seeds of Success . . . . . Carol Spurrier
Seismic Safety in BLM Buildings . . . . . Linda Force
Shrub Steppe Dataset Project . . . . . Mark Hilliard
Sustainablilty Program . . . . . Linda Force
Technical Working Group, Roundtable on Sustainable Forests . . . . . John Stewart
Unexploded Ordnance – Handbook 1703-2 for Land Managers . . . . . Andrea Mclaughlin
Utilization of Classified Data . . . . . Ed Harne
User Representative for the Grazing Authorization and Watershed Initiatives and Salinity Control . . . . . Eric Janes
User Representative for Inventory Data System . . . . . Dick Mayberry
User Representative for SSST, STS, IHICS, and PLS . . . . . Chris Jauhola
Volunteer Awards Support . . . . . Bibi Booth
VRM and GIS Intregration Project . . . . . Rodger Schmitt
WO-230 Technical Support and Misc. Interagency Coordination . . . . . Mike Haske

Wyoming

Aquifer Protection for Oil/Gas Development in Green River Basin, Wyoming . . . . . Phil Howland
Advance Remote Sensing Technologies for Monitoring Postburn Vegetation Trends and Conditions . . . . . Bruce Keating
Design for Construction of the Red Hole Bridge . . . . . Jim Honn
Geophysical Survey of the Poison Spider Oil Pit . . . . . Ken Henke
Keeping Water on the Land Longer . . . . . Dennis Doncaster

Wyoming *(continued)*

Red Gulch Wyoming Dinosaur Track Site – Detailed Terrestrial Photogrammetry . . . . .Darrell Barnes
Remote Sensing Presentation and Short Course for Wyoming R/S Workshop . . . . . .Gretchen Meyer
Rock Springs Administrative Offices – Title 1 Design . . . . . .Don Schramm
Rock Springs Administrative Offices – Title 1 Design Completion . . . . . .Don Schramm
Sand Creek Bridge . . . . . .Jim Kor
Scoping of the Hydrologic Parameterization and Modeling Project
for the Casper Field Office . . . . . .Joe Meyer
Wyoming 100K Mapping (FY 2000–2001) . . . . . .Patrick Madigan
Workshop Course Development for Annual WY BLM GIS User Group Meetings . . . . .Gretchen Meyer
Wyoming Bridge Inspections . . . . . .Jim Kor

National Business Center

BLM Annual Report 2000 . . . . . .Robert Woerner
National Business Center Newsletter . . . . . .Robert Woerner
Reutilizing and Recycling . . . . . .Sheri Johnson

National Human Resources Management Center

Inclusion Through Education . . . . . .Lorenzo Cervantes
H-1112-1 Safety and Health Management . . . . . .Dick King
Rohn Tower Evaluation and Retrofit . . . . . .Bruce Prater

National Information Resources Management Center

Land and Resources Project Office Signs . . . . . .Leslie Cone
LR2000 Exhibit . . . . . .Leslie Cone

National Interagency Fire Center

Idaho 100K Mapping (FY 2001) . . . . . .Katy Madrid
NIFC Standard Design Development . . . . . .Paul Hefner
NWCG Geospatial Task Group . . . . . .Katy Madrid

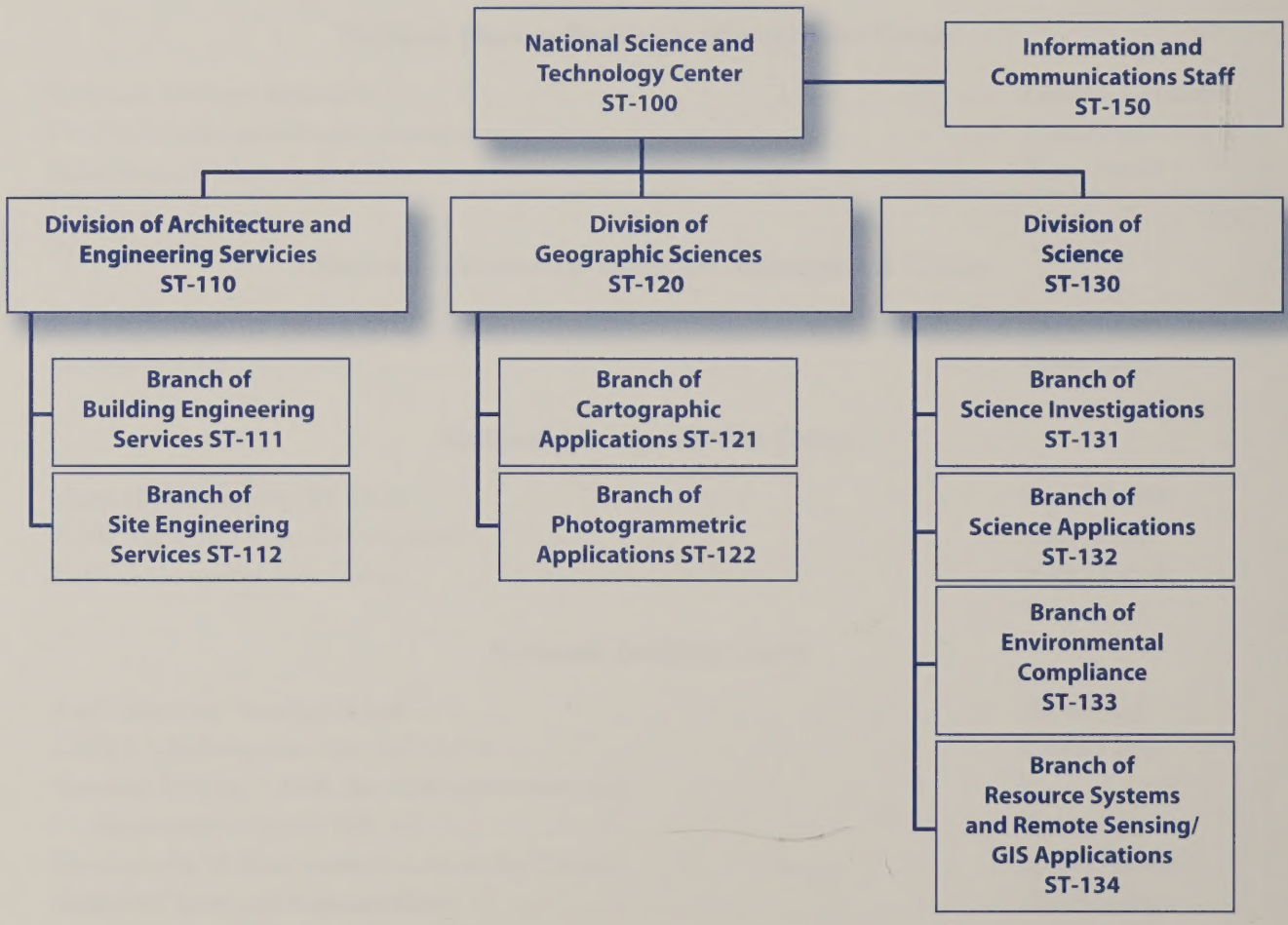
National Training Center

Air Conformity Training Course . . . . . .Russ Krapf
CERCLA Enforcement Class (1703-19) . . . . . .Linda Costa
Conduct Training – AML Site Characterization and
Reclamation Class (1703-14) . . . . . .Linda Costa
Development of Time Series GIS Modeling Course . . . . . .Diane Nelson
Engineers' Roles and Responsibilities . . . . . .Bob Meyers
GeoData Collection and Use Course . . . . . .Diane Nelson
GIS Training Needs Assessment for Bureau Planning . . . . . .Diane Nelson

National Training Center *(continued)*

Lands and Realty Training ..... June Bailey
Modules for Basic Training Course for
Hazardous Materials Coordinators (1703-00) ..... Robert Sykes
Nonpoint Source Pollution Training (7000-09) ..... Russ Krapf
Stream Dynamics and Channel Design for Reclamation ..... Russ Krapf
Time Series Modeling Course Development ..... Diane Nelson

Appendix B. National Science and Technology Center Organization


National Science and Technology Center ST-100
Information and Communications Staff ST-150
Division of Architecture and Engineering Servicies ST-110
Division of Geographic Sciences ST-120
Division of Science ST-130
Branch of Building Engineering Services ST-111
Branch of Site Engineering Services ST-112
Branch of Cartographic Applications ST-121
Branch of Photogrammetric Applications ST-122
Branch of Science Investigations ST-131
Branch of Science Applications ST-132
Branch of Environmental Compliance ST-133
Branch of Resource Systems and Remote Sensing/ GIS Applications ST-134

National Science and Technology Center (ST-100)

Lee Barkow – Director
Michael Kirby – Associate Director
Rheda Dodd – Executive Assistant

Louise Ecoff – Business Manager
Carol Giffin – USGS Employee/Liaison

Division of Architecture and Engineering Services (ST-110)

Robert Hart – Division Chief
Deanna Miller – Secretary

Scott Hansen – Special Projects Coordinator
Russ Virgin – Construction Manager

Branch of Building Engineering Services (ST-111)

Thomas Busch – Branch Chief

Frank Ciesel – Architect
Phillip Luu – Structural Engineer
Ernest Parrott – Architect
ChanhTran – Mechanical Engineer
Sue Weber – Engineering Technician
Young Yu – Electrical Engineer
Vacant – Architect
Vacant – Engineering Technician
Vacant – Specification/IT Coordinator

Branch of Site Engineering Services (ST-112)

Patrick Fleming – Branch Chief

Keith Christiansen – Structural Engineer
Gary Fisk – Structural Engineer
Mary Anne Nelson – Civil Engineer
Mark Pritchett – Landscape Architect
Tanya Pardy – Civil Engineer
Elizabeth Smith – Structural Engineer
Vacant – Engineering Technician

Division of Geographic Sciences (ST-120)

Fred Batson – Division Chief
Vacant – Secretary

Branch of Cartographic Applications (ST-121)

William Jackson – Branch Chief

Neal Anderson – Cartographic Quality Control
Faye Bogan – Cartographic Lab Specialist
Donald Decicco – Cartographer
Susan Derr – Cartographic Technician
Keith Francis – Cartographic Development Specialist
Mary Ann Guinea – Cartographer
Daniel Sedillo – Cartographic Technician
Chris Smith – Cartographic Development Specialist

Branch of Photogrammetric Applications (ST-122)

Neffra Matthews – Branch Chief

Lawrence Cunningham – Aerial Photo Acquisition Coordinator
Paul Graves – Photogrammetrist
Russell Jackson – Photogrammetrist
David Kett – Photogrammetrist
Michael Marchase – Photogrammetrist
Tom Noble – Cartographer-Data Management
Nancy Russell – Photogrammetrist
Constance Slusser – Aerial Photo Archivist
Betty Wilson – Photo Lab Specialist

Division of Science (ST-130)

Charisse Sydoriak – Division Chief
Vida Jenkins – Secretary
Elsie Pacheco – Secretary

Branch of Science Investigations (ST-131)

Tom Roberts – Branch Chief

Steven Barrell – Geologist
Phillip Dittberner – Plant Ecologist
Bruce Durtsche – Terrestrial Species Disease Specialist
Victoria Josupait – Management Analyst
Brian St. George – Natural Resource Specialist
Bruce Van Haveren – Science and Research Advisor
Vacant – Outdoor Recreation Planner
Vacant – Statistician

Branch of Science Applications (ST-132)

Daniel Muller – Branch Chief

Jacek Blaszczynski – Terrain Modeling Specialist
James Fogg – Surface Water Modeling Specialist
Donald Prichard – PFC Fishery Biologist
Paul Summers – Hydrogeologic Specialist
Steve Swanson – River Modeling Specialist
William Williams – FORVIS/Forest Inventory Specialist
Bill Ypsilantis – Soil Condition and Health Specialist
Vacant – Air Modeling Specialist
Vacant – Inventory and Monitoring Specialist

Branch of Environmental Compliance (ST-133)

David Schafersman – Branch Chief

Scott Archer – Air Quality Specialist
William Carey – Water Quality Specialist
Karl Ford – Toxicologist
Pamela Innis – Environmental Engineer
Brent Lewis – Geophysical Survey Specialist
Paul Meyer – Resource Damage Specialist
Thomas Morris – Computer Specialist
Kenneth Smith - Environmental Protection Specialist
Janet Youngdahl - PRP Investigator

Branch of Resource Systems and Remote Sensing/GIS Applications (ST-134)

Debra Dinville – Branch Chief

Wendy Bullock – GIS Development Specialist
Pamela Clemmer – Remote Sensing Specialist
Jerald Farringer – Wildlife Systems Manager
Susan Goodman – GIS Development Specialist
Dianne Osborne – GIS/Remote Sensing Specialist
Leon Pack – Grazing and Range Systems Manager
Kathy Pino – Information Systems Support
Richard Stark – Wild Horse and Burro System Manager
Mary Beth Stulz – GIS Development Specialist
Vacant – Forestry Systems Manager
Vacant – GIS/Remote Sensing Specialist
Vacant – Project Manager

Information and Communications Staff (ST-150)

Terry D'Erchia – Staff Chief
Helen Sweeney – Secretary

Ethel Coontz – Visual Information Specialist
Peter Doran – Visual Information Specialist
Deborah Harris – Writer-Editor
Randy Hayes – Webmaster
Linda Hill – Writer-Editor
Jennifer Kapus – Visual Information Specialist
Janine Koselak – Visual Information Specialist
Jennifer Knudson – Intern
Kathleen Rohling – Writer-Editor
Vacant – Historian

BLM Library

Barbara Campbell – Library Director

Elizabeth Araki – Reference Librarian
Kenneth Grace – Microform Equipment Operator
Barbara Klassen – Catalog Librarian
Nathan Matthews – Library Technician/ Microform Equipment Operator
Joan Penzien – Reference Librarian
Crystal Talavera – Library Technician
David Woodworth – Library Technician

BLM Library
Denver Federal Center
Bldg. 50, OC-521
P.O. Box 25047
Denver, CO 80225

Production services provided by:

National Science & Technology Center
Bureau of Land Management

Information and Communications Staff
Terry D'Erchia, Chief (303-236-6547)

Lee Barkow, Director
National Science and Technology Center
P.O. Box 25047
Denver, Colorado 80225-0047

The Bureau of Land Management's National Science and Technology Center supports other BLM offices by providing a broad spectrum of services in areas such as physical, biological, and social science assessments; architecture and engineering support; library assistance; mapping science; photo imaging; geographic information systems applications; and publications support.

BLM/ST/GI-02/001+1300
☆ GPO: 2002—773-309/54019

The mention of trade names or commercial products does not constitute endorsement or recommendation for use by the Federal Government.